Diffuse affect as regulator of attitude and behavior processes

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Diffuse affect as regulator of attitude and behavior processes

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Chapter 1

General Introduction

It is the ice age and you need to migrate south to survive, but you are left behind by your family. This is what happens to the ever happy and cheerful Sid the Sloth in the animated movie “Ice age”. Sid tends to follow the first thing that comes to his sloth mind. For instance, eating the last dandelion left, right in front of two rhinos who were just about to eat it. Of course this gets him into big trouble. Fortunately for Sid, Manny the ‘melancholic’ mammoth passes by and rescues Sid from the rhinos. Manny is more of the thinking type and when Sid and Manny find a lost human baby, Manny is hesitant to bring it back to its ‘herd’, thinking about the consequences it might have. Sid, on the other hand, jumps intuitively to the baby’s rescue, plunging him, Manny and the baby in a dangerous adventure. This tale is an animated Hollywood movie, largely based on the fantasy of the writers. Nevertheless, in a way it reflects two basic mechanisms of behavior regulation. The sad Manny tends to be cautious and thinks over problems, before coming into action. The happy Sid, however, tends to follow the first thing that comes to his mind, acting intuitively.

In the case of Sid and Manny the mood state they are in seems chronic. In “real life”, however, mood states will fluctuate dependent on for instance the situation one is in. Information processing will change with mood. The differential influence of diffuse positive and negative affect on information processing is well known in social psychology. A diffuse affective state or mood can be defined as a positive or negative feeling that is not attributed to a specific source or cause. This differentiates diffuse affect from specific emotions, which are affective states that *are* attributed to a source. For instance, you can feel angry because your neighbor is calling you names. In that case, the emotion anger is likely to immediately lead to action, directed at the source of the emotion, e.g., punching the guy in the face. Diffuse affect, however, is not attributed to a source, therefore not directly guiding behavior towards the source. However, as we will see, mood may have important implications for behavior regulation. Diffuse affective states may influence behavior by altering an individual’s cognitive style.

In general, diffuse positive affect induces an intuitive processing style, while negative diffuse affect leads to deliberative processing. The information processing style adopted as a function of mood can influence a wide range of aspects in our everyday lives. Consider for instance purchasing a product. You are in a computer shop to buy a new mouse. On your way to the counter you pass by a discount stand with computer games. As you really enjoy playing video games and you just finished your last one, you stop to choose one. One possibility is that you systematically think over pros and cons of the games and make a decision. On the other hand, you can also choose a game on the basis of the picture of an attractive woman on the front, without much elaborating on its features. These two processes are thus thought to be influenced by mood. Negative mood leads to systematic processing, which will lead to elaborating on features of the games and culminate in choosing the game with the best features. Positive mood will probably lead you to decide on the basis of the picture on the front.

The process of thinking over pros and cons is mostly a conscious and deliberative process, without much automatic processing. Deciding on the basis of the pretty woman on the front of the game is more automatic and less deliberative than elaborating on knowledge. Still, there is a controlled component in this behavior. However, a part of human behavior actually is more automatic than it is controlled. Behavior can be thoughtless and unintentional, for instance when buying a game you may just as well walk past that discount stand on your way to the counter and grab one impulsively. What influence could mood have on this process? Strikingly, very little attention has been given to automatic processes and subsequent behavior in relation to mood influences on information processing. In general, mood research has focused on the effect of diffuse affect on explicit judgments (e.g., answering questions on 7-point scales). Due to this lack of attention to automatic processing and behavior regulation, the potential differential effect of positive and negative diffuse affect on this form of processing is largely unknown. The goal of the present dissertation is to extend our knowledge about this matter. Specifically, we will examine the influence of positive and negative diffuse affect on automatic attitude processes and on the role of automatic (versus controlled) processes in behavior regulation.

Information processing styles

Mood is assumed to elicit reliance on one of two processing styles. The assumption of two information-processing styles has also been posited by several self-regulation theories. These

theories assume that there are two distinct systems in which information is processed (e.g., Kuhl, 2000; Strack & Deutsch, 2004; Schwarz, 2002). In general these dual process theories posit that in one system processing is rather deliberative or reflective, while processing in the other system is more intuitive or impulsive. The deliberative system is designed for serial and analytical processing (Kuhl, 2000). Processes in this system are based on using knowledge and reasoning and elaborating on consequences to arrive at decisions and behavior (Strack & Deutsch, 2004). Information in this system is rather abstract and a rule can be learned based on only one experience (Smith & DeCoster, 2000). Although rules can be learned fast in this system, the processing of information in this system is slow and the system is limited in the amount of information it can handle (Dijksterhuis, 2004). The intuitive system is considered to be an associative network. In this network elements are linked through simple associations (Epstein & Pacini, 1999; Kuhl, 2000; Smith & DeCoster, 2000; Strack & Deutch, 2004). The activation of an element in this network spreads to other elements, including behavioral schemata (Strack & Deutsch, 2004). The acquisition of new information is slow, however, requiring multiple repetitions. Processing in the system is holistic, parallel and rather automatic (Epstein & Pacini, 1999; Kuhl, 2000; Smith & Decoster, 2000). Therefore, the process is fast and requires little capacity (e.g., Smith & Decoster, 2000).

Thus, the intuitive system can be seen as an associative network, in which information is linked through simple associations. In the deliberative system information is processed in an analytical and detailed fashion. A number of these theories explicitly suggest that mood should moderate information processing style (e.g., Kuhl, 2000; Smith & Decoster, 2000; Schwarz, 2002).

Diffuse affect and information processing

Research on the influence of affective states on information processing has revealed several interesting effects, which are generally in accordance with self-regulation theories. First, mood influences the reliance on heuristics and general-knowledge structures. For instance, in the domain of stereotyping it has been found that in a positive mood people tend to rely more on category information and stereotypes than neutral or sad participants (e.g., Bless & Fiedler, 1995; Bless, Schwarz, & Wieland, 1996; Bodenhausen, Kramer, & Süsser, 1994; Forgas & Fiedler, 1996; Park & Banaji, 2000). Conversely, negative mood leads people to correct for stereotypes that are inappropriate to a greater extent than positive mood (Lambert, Khan, Lickel, & Fricke, 1997). Outside the stereotype domain research suggests that happy

individuals tend to rely more on scripts (e.g., Bless, Clore, Schwarz, Golisano, Rabe, & Wolk, 1996), the ease of retrieval heuristic (Ruder & Bless, 2003) and peripheral cues in persuasive messages (Bless, Mackie, & Schwarz, 1992; Schwarz, Bless, & Bohner, 1991). Thus, it seems that in positive mood individuals tend to rely more on heuristics and general-knowledge structures than negative mood individuals.

Negative mood induces a tendency to elaborate on information to a greater extent than positive mood. For instance, strong arguments are more persuasive than weak arguments in negative mood than positive mood (Bless, Bohner, Schwarz, & Strack, 1990) implying elaboration on message content in negative mood. Analytical tasks are executed better by sad individuals than happy ones (Fiedler, 1988; Melton, 1995). From these studies it may be concluded that, contrary to positive mood, negative mood elicits a deliberative information processing style.

Also, mood effects on associative processing have been found. In general happy individuals tend to rely more on their associations than sad individuals (Bolte, Goschke, & Kuhl, 2003; Hänze & Hesse, 1993; Isen, Johnson, Mertz, & Robinson, 1985; Storbeck & Clore, 2005). For instance, it has been found that in positive mood in comparison to neutral or negative mood the number of unusual word associations in response to neutral words increases (Isen et al., 1985). Furthermore, in positive mood responding to strongly associated semantic word pairs is faster (Hänze & Hesse, 1993), and false recall of highly associated words in a false memory paradigm increases (Storbeck & Clore, 2005). Thus, a number of studies have already focused on mood effects on associative processing.

Considering self-regulation theories and the research reviewed above it seems that in general positive mood leads to intuitive processing, while negative mood leads to deliberative processing. But what is the reason why mood has this impact on information processing?

Why diffuse affect influences information processing

Several theories can account for these effects of mood on information processing. One explanation argues that under positive mood cognitive capacity is reduced, therefore inducing heuristic processing (Mackie & Worth, 1989; 1991). Positive mood is thought to lead to the activation of other positive material in memory. This activation will then either take up capacity in memory (Isen, Means, Patrick, & Nowicki, 1982) or distract the individual (Isen, Daubman, & Nowicki, 1987), either way decreasing cognitive capacity. When cognitive capacity is low in positive mood it is not possible to engage in effortful processing, while as

capacity is high in negative mood deliberative processing is possible. Thus, one way to explain the differential influence of mood states on information processing is by reduced cognitive capacity in positive mood.

Another theory suggests that when in a positive mood, individuals are motivated to remain in this mood state and therefore refrain from elaborate thought on tasks that might be threatening to their happy mood (Wegner & Petty, 1994). This motivation to remain in a positive mood induces a tendency to adopt a heuristic rather than a deliberative processing style. Negative mood, on the other hand, does not elicit such a motivation. Therefore, deliberative processing will not be avoided. Thus, both the capacity and the motivation account can explain mood effects on information processing.

According to the third theory, the cognitive tuning account (Schwarz, 2002; see also Bless & Schwarz, 1996 for similar assumptions), our cognitive processing is tuned to the specific requirements of the situation. By differentiating between benign and problematic situations cognitive tuning can be explained. First, when everything goes smoothly and there is nothing in the situation that hinders us, we will be likely to rely on routines and heuristics that usually serve us well. Generally, when everything is going smoothly, we also feel good. For instance, when assembling a wardrobe closet and everything fits at once, you will be likely to feel good. In this way benign situations have become linked to positive affect. This relation is assumed to be bidirectional. Thus the experience of positive diffuse affect will signal that everything is going smoothly (i.e., the current situation is safe and benign). As a result an intuitive processing style is adopted.

When a problem arises in our environment we abandon reliance on routines and we tend to adopt a deliberative and cautious processing style (i.e., a processing style aimed at avoiding errors; Fiedler, 2001) focusing on the specifics of the situation to determine the problem and to be able to do something about it. In general, when something goes wrong, we also feel bad. Imagine assembling that wardrobe closet and the doors just won't fit. This will probably make you feel bad. Thus, problematic situations are linked to negative affect. Then, experiencing diffuse negative affect will signal that something is wrong. This will elicit a deliberative and cautious processing style. Thus, diffuse affect, among others like exposure to happy and sad facial expressions, acts as a signal of the state of the environment.

To summarize, three different accounts can explain the effect of mood on information processing. First, positive diffuse affect may require more capacity than negative diffuse affect. Second, positive diffuse affect may elicit motivation to remain in this state. Last,

diffuse affect may provide information about the state of the current situation. These three theories and empirical findings in general show that individuals with positive mood tend to adopt an intuitive processing style, while individuals with negative mood tend to adopt a deliberative style.

Taking the research and theorizing on mood together there is ample evidence of mood influences on information processing. However, this research has mainly focused on the influence of mood on explicit judgments. Not much is known yet about possible effects of mood on more automatic processing and behavior regulation. First, it would be interesting to examine the influence of diffuse affect on automatic processing, as a large part of information processing generally is automatic. Intuitive processing is assumed to be more conducive of automatic processing than deliberative processing. Therefore, it can be expected that positive and negative diffuse affect have a differential impact on automatic processing. Second, although it is of interest to explore the effects of mood on information processing, it is important to examine mood effects on behavior regulation as well. Acting adaptive in a certain situation will prevent you from incurring negative consequences (e.g., getting hurt or worse) or provide you with positive consequences (e.g., getting food). Therefore, it is of importance to study the impact of diffuse affect on behavior regulation. The present dissertation will focus on these issues in the domain of attitudes.

Attitudes

An influential definition of an attitude is "*the psychological tendency to evaluate a particular entity with some degree of favor or disfavor*" (Eagly & Chaiken, 1993). In other words, attitudes are evaluative on a dimension of positive versus negative and attitudes are always evaluations of an entity. This entity can be a physical object, a person, an institute or a concept. It has become evident that an attitude can be both the outcome of automatic processes and controlled processes. More specifically, an attitude can be automatically activated upon perceiving the object (Fazio, 1990; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Fazio & Towles-Schwen, 1999), while an attitude can also be based on elaborating on knowledge and beliefs about the object (Ajzen, 2001; Ajzen & Fishbein, 1977; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press). First the process of automatic activation of attitudes will be discussed. Next, deliberative attitude processes will be outlined.

Automatic attitude processes

Characteristic of an automatic process is that the presentation of an external stimuli leads to the activation of a response or concept, regardless of the individuals attempt to ignore it (Shiffrin & Dumais, 1981). Applying this to the field of attitudes this means that when an attitude object is presented the attitude will be activated without reflection on the object. In other words, when perceiving an object in the environment the associated evaluation is activated automatically (Fazio, 1990; Fazio, et al., 1986; Fazio & Towles-Schwen, 1999). This automatic evaluation process was first demonstrated by Fazio and colleagues (1986). In a reaction time paradigm they showed that the presentation of an attitude object (e.g., flower) facilitates responding to an evaluative congruent word (e.g., good), which is presented immediately after the attitude object. Responses are slowed down, however, when the attitude object is followed by an evaluative incongruent word (e.g., bad). In theoretical terms, when the attitude object 'flower' is perceived the positive attitude towards this object is activated, therefore making it easier to respond to words that are congruent, i.e., positive words, and harder to respond to words that are incongruent, i.e., negative words.

Next to automatic attitude activation, the term implicit attitude is often used in the attitude literature. The automatic activation of attitudes is not entirely identical to implicit attitudes. Implicit attitude measures (e.g., implicit association test; Greenwald, McGhee, & Schwartz, 1998) do not directly measure the activation of an attitude, but rather the association between the object and the evaluation. Nevertheless, implicit attitudes are more likely to be influenced by automatic processing than reflective attitudes. Although implicit attitude measures have a controlled component, they are also partly automatic (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005). In line with this, intuitive processing as outlined before does not entail only automatic processing. However, intuitive processing is thought to be more conducive of automatic processing than deliberative processing.

Automatic attitude activation has been found to be associated with the activation of certain brain areas, specifically with activation of the amygdala (Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003; Cunningham, Raye, & Johnson, 2004). The amygdala is thought to be associated with emotional learning and immediate responses to stimuli (e.g., Fellous & LeDoux, 2005; Phelps, O'Conner, Gatenby, Gore, Grillon, & Davis, 2001). The amygdala is assumed to be involved in providing a crude and quick evaluation. It has been shown that when an individual perceives an attitude object the amygdala is activated, regardless of whether an instruction to evaluate has been given (Cunningham, et al., 2004).

Furthermore, amygdala activation correlates with implicit measures of attitudes (Phelps, O'Connor, Cunningham, Funayama, Gatenby, Gore, & Banaji, 2000).

When an attitude is activated automatically it may subsequently influence our judgments and behavior. In fact, evidence for the predictive value of automatically activated or implicit attitudes is accumulating. Several different implicit attitude measures have been found to predict judgments (Dunton & Fazio, 1997; Fazio, Jackson, Dunton, & Williams, 1995; Florack, Scarabis, & Bless, 2001; Greenwald & Farnham, 2000; Olson & Fazio, 2004a; Rudman & Glick, 2001; Rudman & Lee, 2002; von Hippel, Sekaquaptewa, & Vargas, 1997). For instance, in the stereotype domain implicit measures on racial attitudes have been found to affect judgments and evaluations of African-American or other minority group persons (Dunton & Fazio, 1997; Olson & Fazio, 2004a; Rudman & Lee, 2002; von Hippel et al., 1997; Florack et al., 2001).

Furthermore, behavior is influenced by implicit attitudes as well (Asendorpf, Banse, & Mücke, 2002; Bessenoff & Sherman, 2000; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Dovidio, Kawakami, & Gaertner, 2002; Fazio et al., 1995; Jordan, Spencer, & Zanna, 2002; McConnell & Liebold, 2001; Neumann, Hülsenbeck, & Seibt, 2004; Sekaquaptewa, Espinoza, Thompson, Vargas, & Von Hippel, 2003; Wilson, Lindsey, & Schooler, 2000). For instance, several studies have shown that the implicit attitude towards blacks and whites is predictive of the quality of an interaction with a black person (Fazio et al., 1995) and non-verbal behavior, like for instance smiling, eye contact and touching, displayed in the interaction (Dovidio et al., 1997; Dovidio et al., 2002; McConnell & Liebold, 2001; Sekaquaptewa et al., 2002; Wilson et al., 2000; for an overview see Fazio & Olson, 2003). Thus, implicit attitudes can influence judgments and behavior. Nonetheless, mixed results on the impact of implicit attitudes on behavior have been found as well (e.g., Karpinski & Hilton, 2001; Rudman & Glick, 2001). For instance, an implicit attitude measure on apples and candy bars did not predict the choice between an apple and a candy bar (Karpinski & Hilton, 2001).

Deliberative attitude processes

In addition to automatic processes, attitudes can be based on controlled and deliberative processing as well. Attitudes that are formed through deliberative processing are generally thought to have beliefs as a main source. Attitudes are thought to be based on the expectancy and the evaluation of different behavioral outcomes and attributes of the attitude object as

suggested by expectancy-value models (e.g., Fishbein, 1967). These models in general suggest that attitudes depend on expectancy and evaluation. Consider for instance the attitude towards sorting of household garbage. This attitude can be influenced by the expectancy of several behavioral outcomes and attributes, such as the likelihood of contributing to a better environment or the likelihood of spending a lot of time on sorting your garbage, and the evaluation of these outcomes and attributes, such as contributing to a better environment is good and spending to much time is bad. Thus an attitude is formed by scrutinizing on specific attributes of the object, analyzing the positive and negative features of an object and elaboration of possible consequences. (Ajzen, 2001; Ajzen & Fishbein, 1977; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press). These more complex attitudes in fact are associated with the activation of the prefrontal cortex (Cunningham et al., 2003; Cunningham et al., 2004), which is consistent with the assumption that the prefrontal cortex is assumed to be involved in higher order cognition, like deliberative processing (e.g., Duncan & Owen, 2000).

Attitudes based on beliefs are also assumed to be able to influence behavior. The theory of reasoned action (Ajzen & Fishbein, 1977) and the theory of planned behavior (Ajzen, 1985; Ajzen, 2001; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press) are two well-known models of the influence of belief-based attitudes on behavior. In fact an extensive body of research on both theories exists. Results concerning the relation between belief-based attitudes and behavior are mixed though. Some studies indeed show a link between belief-based attitudes and behavior or behavioral intentions (e.g., Ajzen, 2001). For instance, belief-based attitudes have been found to predict safe-sex behavior (Boldero, Sanitioso, & Brain, 1999; Reinecke, Schmidt, & Ajzen, 1996; Sheeran & Taylor, 1999) and smoking (Morrison, Gillmore, Simpson, & Wells, 1996; Norman, Conner, & Bell, 1999). Also, several meta-analyses of studies on predicting safe-sex behavior have shown that attitudes (among other factors) are good predictors of behavior (Albarracín, Gillette, Earl, Glasman, Durantini, & Ho, 2005; Sheeran, Abraham, & Orbell, 1999). On the other hand, weak relations between belief-based attitudes and behavior have been found as well, for instance in the domain of exercising (Bozionelos & Bennett, 1999) and condom use (Sutton, McVey, & Glanz, 1999). Thus, although belief-based attitudes have been found to predict behavior, results are varied.

Moderators of attitude processes

As attitude processes can be both automatic or implicit and deliberative, the question arises when individuals rely on automatically activated attitudes and when individuals elaborate on beliefs? Not much is known about moderators of both attitude processes, with the exception of the factors described by the MODE model, motivation and capacity (Fazio, 1990; in Chapter 4 the MODE model will be discussed) and intentionality of the behavior (Asendorpf, et al., 2002; Dovidio, et al., 2002). The latter moderator refers to the finding that intentional behavior is best predicted by explicit attitudes, while unintentional behavior is mainly guided by implicit attitudes. The present dissertation will focus on the influence of diffuse affect on the automatic activation of attitudes and on the relation between implicit attitudes and behavior and belief-based attitudes and behavior. We propose that negative diffuse affect elicits less reliance on automatically activated attitudes in comparison to positive diffuse affect. Consequently, in negative mood the relation between implicit attitudes and behavior will be weak, while belief-based attitudes will guide behavior strongly. In positive mood, however, the relation between implicit attitudes and behavior will be strong, while beliefs will not be predictive of behavior in this mood state.

Overview of the present dissertation

In this dissertation we examine the influence of diffuse affect on the strength of the automatic evaluation effect and attitude-behavior relations.

The automatic evaluation effect

In Chapter 2 we will examine the effect of diffuse positive and negative affect on the automatic activation of evaluations. The automatic evaluation effect typically involves fast responding to consistent stimulus pairs (e.g., flower and good) and slow responding to inconsistent stimulus pairs (e.g., flower and bad). The idea is that when presented with the first stimulus (the attitude object) the global evaluation of this object is activated. Then subsequent responding to the second stimulus is facilitated when this stimulus is of same valence as the evaluation of the object. Responding to a stimulus which is opposite in valence leads to interference and therefore slows down responding. In this chapter the influence of mood on this effect is examined.

Attitude-behavior relationship

In Chapter 3 the differential impact of positive and negative diffuse affect on the attitude-behavior link is studied. More specifically, the impact of mood on the relation between implicit attitudes and behavior and the relation between belief-based attitudes and behavior is examined. In four studies the implicit attitude, the belief-based attitude or both were measured. In a second session mood was manipulated and behavior towards the attitude object was observed.

In Chapter 4 the empirical findings will be discussed and conclusions will be drawn. Furthermore, I will elaborate on implications of the present work and suggest future research. The empirical chapters in this book can be read independently. Therefore there will be some overlap.

Chapter 2

Automatic Caution: The Influence of Safety and Danger Signals on the Automatic Evaluation Effect*

We spontaneously evaluate objects we encounter in our environment. In a split second, we know whether something is good or bad. This automatic evaluation process was firstly demonstrated by Fazio, Sanbonmatsu, Powell, and Kardes (1986). Fazio et al. (1986) showed that evaluative decisions of nonambiguous positive or negative adjectives (e.g. beautiful) were facilitated after an evaluatively consistent object prime (e.g., party) and inhibited after an evaluatively inconsistent prime (e.g., dentist). These findings suggest that the mere presentation of an attitude object automatically elicits the associated evaluation, which is referred to as the automatic evaluation effect. Other studies, including studies using different paradigms, have provided further evidence for automatic evaluation processes (e.g., Bargh, Chaiken, Govender, & Pratto, 1992; Greenwald, McGhee, & Schwartz, 1998; Hermans, Spruyt, & Eelen, 2003), underscoring the generality of the automatic evaluation effect. Also, recent studies suggest that these automatic evaluation processes are associated with enhanced activation of parts of the brain that are known to be crucial for emotional learning including the amygdala (e.g., Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003; Cunningham, Raye, & Johnson, 2004). Finally, automatic evaluation processes have been found to be associated with behavior towards the attitude object (e.g., Bessenoff & Sherman, 2000; Chen & Bargh, 1997; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Neumann, Hülsenbeck, & Seibt, 2004). The link between automatic evaluation and guidance of approach-avoidance behavior seems functional, because the process serves to automatically avoid negative objects and approach positive ones.

Recently, researchers have obtained evidence for the context dependency of the automatic evaluation process. More specifically, the outcome of the automatic evaluation

* This chapter is based on Hermsen, Holland & van Knippenberg (2006a)

effect has been studied as a function of the specific location (positive or negative) in which the object is presented (Wittenbrink, Judd, & Park, 2001), the salience of attributes of the object (Mitchell, Nosek, & Banaji, 2003) and the goal-relevancy of the object (Ferguson & Bargh, 2004). The present paper is also concerned with context effects on automatic evaluation processes. However, our focus is of a quite different nature. Whereas the studies listed above focus on specific contextual influences that affect the evaluation of specific attitude objects more or less positively, we focus on possible context effects on the automatic evaluation effect in *general*. More specifically, we argue that contextual cues may induce a processing style, or mindset, which may facilitate or impede the automatic evaluation effect. With the exception of trait anxiety (Berner & Maier, 2004), need to evaluate (Hermans, de Houwer, & Eelen, 2001), and attitude strength (Fazio et al., 1986; Fazio, 1995; Bargh et al., 1992) the general conditions that enhance or reduce the automatic evaluation effect have not yet been studied.

The tendency to automatically approach positive objects and automatically avoid negative objects may not be functional across all situations. This may depend on the nature of the situation. When the environment signals that everything is fine, we may relax and go along with our automatic evaluations, which usually serve us well. However, when people receive a signal that the environment is problematic, it is more appropriate to act on the details that are perceived in the environment rather than to act impulsively on the first evaluation that comes to mind. In such cases inhibition rather than facilitation of people's general tendency to evaluatively respond to an object in an automatic manner can be considered appropriate. In the present research we aimed to explore internal cues (diffuse affective states) as well as external cues (facial primes) that may signal whether the environment is problematic or benign as a moderator of automatic evaluations. In contemporary theories it is argued that such *danger* or *safety signals* may alter a person's cognitive processing style. Based on these theories, we suggest that people who receive danger signals (e.g., negative mood and sad facial primes) are more cautious in their judgments than people who receive safety signals (e.g., positive mood and happy facial primes). Elaborating on these ideas, we aim to show that the automatic evaluation effect is stronger after being exposed to safety signals than to danger signals.

Cognitive tuning

Cognitive tuning theory is based on the idea that cognitive processes are in the service of action (James, 1890). To be able to respond to our environment in an adaptive way, cognitive processing should be tuned to the requirements of the environment (Schwarz, 2002). By comparing problematic with benign situations the nature of this cognitive tuning can be examined. When everything goes smoothly and nothing hinders us from attaining our goals, we can rely on routines that served us well in the past. However, when things become problematic, it seems functional to abandon reliance on these routines and start to focus on the problem at hand. In other words, cognitive processes are tuned to nature of the environment, such that benign environments facilitate a relaxed processing style and reliance on routines, whereas problematic situations enhance a cautious, analytic processing style. However, how do we know whether our environment is benign or problematic?

Recent accounts of cognitive tuning theory posit various sources of information that may function as safety and danger signals including internal cues, like bodily feedback (e.g., Friedman & Forster, 2000) and diffuse affective states (Schwarz, 1990) and external cues, including color (Soldat & Sinclair, 2001), and the safety or danger that is implied by the (happy or sad) facial expressions of other people (e.g., Ottati, Terkildsen, & Hubbard, 1997). The present paper will be concerned with diffuse affective states and presentation of happy and sad facial cues.

Internal safety or danger signals: mood

Cognitive tuning theory has been predominantly studied within the domain of diffuse affective states. Generally, when things are fine we feel good, and when things go wrong we feel bad. As a result, people have acquired associations between positive affect and benign situations on the one hand, and negative affect and problematic situations on the other hand. Because of these associations, diffuse positive affective states may serve as a conditioned cue that the environment is safe and benign (e.g., Fiedler, 2001), whereas diffuse negative affective states may signal a possibly problematic situation.

Evidence for the influence of mood on information processing is abundant. For instance, in a positive mood judgments are mainly based on heuristic processes, while in a negative mood they are to a larger extent based on systematic reasoning (e.g., Bless & Schwarz, 1999). It has been shown that, compared to negative mood, positive mood leads to

an increased use of stereotypes (e.g., Bless, Schwarz, & Wieland, 1996; Bodenhausen, Kramer, & Süsser, 1994; Bodenhausen, Sheppard, & Kramer, 1994), scripts (e.g., Bless, Clore, Schwarz, Golisano, Rabe, & Wolk, 1996), the ease of retrieval heuristic (Ruder & Bless, 2003), and peripheral cues (Bless, Mackie, & Schwarz, 1992; for overviews see, Schwarz, 2002; Schwarz, Bless, & Bohner, 1991).

External safety or danger signals: happy or sad facial cues

In addition to internal cues for safety or danger such as mood, the nature of the environment may also be signaled by external social cues. When we are surrounded by happy people, this may signal that the situation is benign. Being surrounded by sad people may signal a problematic situation. Ottati and colleagues (1997) argued that the subliminal presentation of happy versus sad faces may, therefore, result in mood-like effects when it comes to cognitive processing style.

Indeed, subliminal priming with positive facial expressions has, for example, been shown to lead to more persuasion by weak arguments in comparison to negative facial expressions (Soldat & Sinclair, 2001). Exposure to happy faces, furthermore, has been found to increase stereotyping in comparison to exposure to angry faces (Ottati et al., 1997). Although research in this area is relatively scarce, it does indicate that exposure to positive facial expressions elicits heuristic processing similar to positive mood, whereas exposure to negative facial expressions leads to systematic processing similar to negative mood.

Cognitive tuning and automaticity

The effects of mood and facial expressions have been primarily studied within the domain of judgments. These judgmental effects may involve both controlled and automatic processes (Fazio & Towles-Schwen, 1999; Payne, 2001), but the effect of safety and danger signals on their relative impact has so far not been explicitly studied. Furthermore, current theories of these signals, in particular mood theories, remain largely silent about this issue. The affect-and-information approach suggests that positive mood leads to more heuristic processing, while negative mood is said to lead to more systematic processing (Bless & Schwarz, 1999; Schwarz, 1990; Wyer, Clore, & Isbell, 1999). Although automatic versus controlled processes are not explicitly specified in this model, it seems plausible that heuristic judgments are more susceptible to automatic associative knowledge activation, while

systematic processing may to a larger extent rely on controlled processes. Because previous research focused on explicit judgments that allowed for extensive controlled processing, the potentially differential role of automatic evaluative processes in safety and danger signal conditions could not be established in these paradigms.

Automatic caution

We propose that safety and danger signals moderate the automatic evaluation effect. When the environment is safe (signaled by positive affect or happy faces), we expect that individuals adopt an intuitive processing style, and react on the first evaluation that comes to mind. In other words, people will rely on their automatic evaluations, which usually serve them well in order to approach positive objects and avoid negative ones. Thus, we expect that diffuse positive affective states or exposure to happy faces result in the automatic evaluation effect. These safe situations can be considered default. It may be assumed that generally speaking people feel mildly positive. Therefore, one might expect that neutral situations – i.e., conditions in which positive affect is not experimentally elevated – also elicit automatic evaluation effects. In fact, it seems likely that most studies on the automatic evaluation effect are conducted under neutral affective conditions.

However, we expect that danger signals may reduce automatic evaluative responses because of a cautious processing style, i.e., a tendency to avoid errors (Fiedler, 2001). Consistent with the notion that diffuse negative affect (e.g., Bless & Schwarz, 1999) and negative facial expressions (e.g., Schwarz, 2002) signal danger, we expect that the organism responds to these signals by automatically resorting to a cautious processing style. People who receive danger signals suppress response tendencies based on spontaneous associations, basically because these spontaneous associations are error prone. In brief, it may be argued that danger signals affect evaluative responses due to an *automatic caution effect*.

The aim of the present article is not only to show that safety and danger signals moderate automatic evaluation processes, but also to elucidate the underlying process by disentangling the effect of, in particular, danger signals on responses to consistent and inconsistent trials. Remember that the automatic evaluation effect is characterized by fast responses to consistent trials (positive prime – positive target; negative prime – negative target) and relatively slow responses to inconsistent trials (positive prime – negative target; negative prime – positive target). This pattern of results is expected when individuals receive

safety signals. Due to reliance on the first evaluation that comes to mind, individuals receiving safety signals will be able to respond fast to consistency, but will be hampered by the experience of inconsistency.

In contrast, assuming that danger signals elicit a cautious processing style, it is expected to *only* influence responses to consistent trials. These danger signals enhance the need to avoid errors. Therefore, individuals who receive these signals may benefit from restraining quick responses to consistent stimuli, i.e., to automatically resist the temptation to respond quickly to what at first glance seems the natural thing to do. Due to this automatic caution effect, individuals receiving danger signals will respond slower to consistent trials in comparison with individuals who received safety signals. This effect will not only be apparent when comparing danger signal conditions to safety signal conditions. If danger signals impede responding to consistency this should also show in comparison to a neutral baseline.

Importantly, automatic caution is assumed to be triggered only by conditions that tempt people to respond spontaneously. Evaluative consistency of prime and target constitutes such an enticing condition. Therefore, danger signals are assumed to influence only responses to consistent trials and not to inconsistent ones.

The present research

In three studies, we test the general hypothesis that the automatic evaluation effect is stronger in safety signal conditions than in danger signal conditions. More specifically, we aim to show that this reduction in the automatic evaluation effect is due to slow responding to consistencies in danger signal conditions. These ideas were tested by using mood (Studies 2.1 and 2.2) as an internal safety signal and by subliminal primes with happy versus sad facial expressions (Study 2.3).

In the first study, accidental individual differences in affect are measured and the automatic evaluation effect is assessed by means of an affective priming task (Fazio et al., 1986). In Study 2.2, mood is manipulated and the automatic evaluation effect is measured using the Extrinsic Affective Simon Task (EAST; De Houwer, 2003). In the final study happy or sad faces are subliminally presented and the automatic evaluation effect is measured using an affective priming task. Furthermore, this task contained a baseline in order to be able to determine facilitation and inhibition of consistency and inconsistency (Fazio et al., 1986) for the happy and sad facial expression conditions separately.

Study 2.1

Method

Participants

Thirty-three students (8 men and 25 women) of the Radboud University Nijmegen took part in this study. They received 3 euros for their participation. The data of three participants were removed, because they did not follow the instructions properly. Thus, in total the data of thirty participants was used in the analyses.

Procedure

First, an affective priming task was administered (Fazio et al., 1986). Participants had to respond to positive and negative adjectives by pressing one of two keys (indicating 'good' vs. 'bad'). Before the presentation of each target word a prime word was flashed during 200 ms, followed by a 100 ms interval before onset of the target word (i.e., stimulus onset asynchrony = 300 ms). The primes consisted of positive or negative attitude objects. An automatic evaluation effect is obtained when responses to evaluatively consistent prime-target trials are faster than responses to evaluatively inconsistent trials.

Ten positive (e.g., *nice*) and 10 negative (e.g., *mean*) adjectives were used as targets in the affective priming task. The primes consisted of five positive objects (e.g., *holiday*, *party* and *gift*) and five negative objects (e.g., *snake*, *funeral* and *cancer*). After 10 practice trials, four test blocks of twenty trials each followed. Within each test block, all twenty targets were presented once and all primes were presented twice, once paired with a same valence target and once with an opposite valence target. The allocation of valence to response key was counterbalanced between participants. After completion of the affective priming task, participants indicated on a 5-point scale to what extent they felt *positive*, *satisfied*, *negative* and *sad*. An index of positive and negative affect was constructed by averaging responses to *positive* and *satisfied* and to *negative* and *sad* respectively. For the positive affect index higher scores mean increased positive affect, for the negative affect index higher scores indicates increased negative affect.

Results and discussion

Reaction times below 300 ms and above 3000 ms were set equal to respectively 300 ms and 3000 ms. Reaction times of error trials (mean rate = 3.85%) were removed from the data. Because in a preliminary analysis the last test block showed neither an automatic evaluation effect nor any effect of mood, the average reaction time of this block was used to control for individual differences in reaction times when testing for separate effects on consistent and inconsistent items. The mean reaction times on the consistent and inconsistent trials of the remaining three test blocks were calculated and the reaction times of the consistent trials were subtracted from the inconsistent trials to calculate an index of the automatic evaluation effect. Overall, no automatic evaluation effect was found, $M = .02$, $SD = .08$, $t(29) = 1.20$, *ns*. The automatic evaluation effect index was regressed on the positive and the negative affect index, which revealed an effect of negative affect, $\beta = -.50$, $t(26) = -2.45$, $p < .05$, such that as the participant's level of negative affect increases, the automatic evaluation effect is reduced. No effect of the positive affect index was found, $\beta = -.13$, $t(26) = -.63$, *ns*[1].

To examine whether negative affect influenced the consistent or inconsistent trials, separate analyses were performed for each type of trials. A regression with reaction times on consistent trials and average reaction time (to control for individual differences) and the affect measures revealed a marginal effect of negative affect, $\beta = .23$, $t(26) = 1.94$, $p = .06$. The more negative mood reported, the slower the responses to the consistent trials. Also an effect of average reaction time was found, $\beta = .82$, $t(26) = 8.09$, $p < .001$. When in general response times increased, the reaction times on the consistent trials increased as well. Again, no effect of the positive affect index was found, $\beta = .02$, $t(26) = .20$, ns. A similar analysis with reaction times on inconsistent trials and average reaction time did not yield an effect of negative affect, $\beta = .08$, $t(26) = .69$, *ns*, or positive affect, $\beta = -.01$, $t(26) = -.10$, *ns*. An effect of average reaction time was found, $\beta = .85$, $t(26) = 8.54$, $p < .001$. When in general response times increased, the reaction times on the inconsistent trials increased as well. In Figure 2.1 the nature of the effect of negative affect is shown.

Thus, in line with our predictions, negative affect influences the automatic evaluation effect. More specifically, enhanced negative mood leads to slower reaction times to

[1] Preliminary analyses showed no effect of valence of trials in this study. Also, controlling for errors (p's < .07) and average reaction times (p's < .05) did not affect the reported results in all studies, suggesting that the obtained effects cannot be ascribed to motivational differences.

consistent trials. Furthermore, valence of the targets did not yield any effects, indicating that no mood congruency took place. This would have manifested itself when increased negative affect had led to faster responding to negative targets in comparison to positive targets, which was not the case. In Study 2.2, we further investigated the influence of mood on automatic evaluations. This time mood was manipulated rather than measured. Furthermore, the EAST was used to measure the automatic evaluation effect.

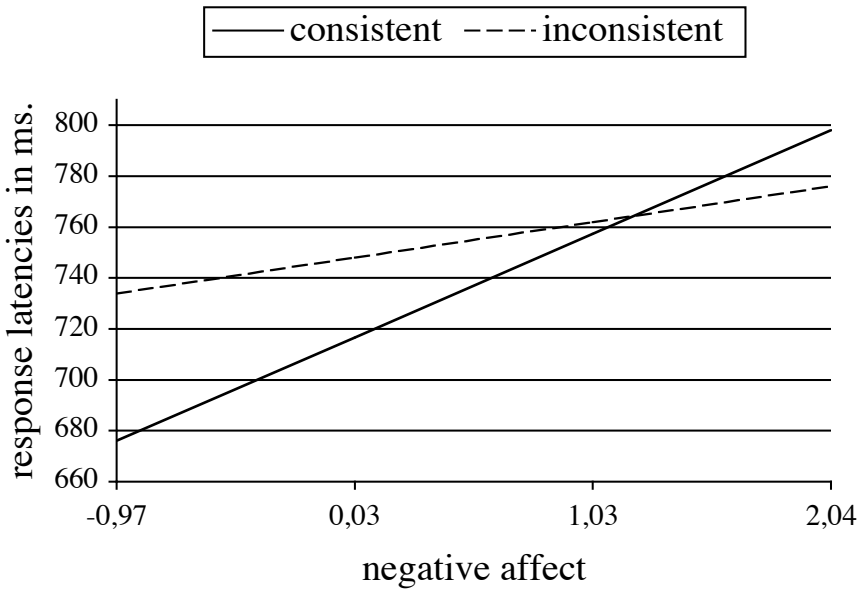

Figure 2.1. Mean response latencies on the consistent and inconsistent trials of the affective priming task of Study 2.1 as a function of negative affect. Higher negative affect scores means higher negative affect.

Study 2.2

Method

Overview

Participants watched one of three video fragments to induce either a positive, neutral or negative mood. Then they proceeded with the critical trials of the EAST.

Participants

Thirty-nine students (16 men and 23 women) of the Radboud University Nijmegen participated in return for 4 euros. Four participants failed to watch the entire film fragment and were excluded from the analyses leaving thirty-five participants of which the data was used.

Mood manipulation

Mood was manipulated by means of three 7-minute film fragments. A fragment of the movie 'Deuce Bigolow, male gigolo' was used for the positive mood condition, a fragment of the Discovery Channel program 'Wood wizard' for the neutral mood condition, and a fragment of the movie 'American history X' for the negative mood condition.

Procedure

Participants started with the instructions and practice trials of the EAST. In this task two types of trials are used, one type of trial consists of white stimulus words against a black background, and the other type of trials consists of colored stimuli (blue and green). The white stimulus words are adjectives and require a positive–negative response using two keys on the keyboard. Thus, during these trials one key will become associated with positive valence, while the other will become associated with negative valence. The colored words are the attitude objects and require a blue–green response with the same keys on the keyboard as used for the positive–negative responses. Thus, the blue key may coincide with the positive key and the green key with the negative one or vice versa. Colored items (the attitude objects) are evaluatively consistent if their valence matches the evaluative meaning of this color's key in the white trials, and inconsistent if their valence is opposite to the evaluative meaning of the key. The automatic evaluation effect is defined as the difference in reaction time between inconsistent and consistent items (the colored trials). The adjectives and objects were identical to those used in Study 2.1.

To ensure that the critical trials of the EAST would directly follow the mood manipulation, instructions and practice trials were presented beforehand. This practice block consisted of 10 white trials and 20 colored trials. The block started with the white words only to establish the association between the response keys and valence. Then participants practiced with the colored words. After participants had practiced the EAST they were instructed to watch the film fragment on the TV–set present in the test room. After having

watched the fragment, participants continued with the EAST. First, ten white and ten colored practice trials were given, to familiarize participants with the task again. Then four critical blocks followed, each containing 30 trials (10 white and 20 colored trials). The mapping of color on evaluative key was counterbalanced between participants. When finished with the EAST, the participants completed the same mood questionnaire as in the previous study.

Results and discussion

As in Study 2.1 reaction times below 300 ms and above 3000 ms were set equal to respectively 300 ms and 3000 ms. Also, error responses (mean rate = 7%) were removed. The mean reaction times of consistent and inconsistent trials were calculated. To test our hypotheses, a 3 (mood: positive vs neutral vs negative) x 2 (consistency: consistent vs inconsistent trials) x 2 (valence of the objects: positive vs negative) ANOVA with consistency and valence as within-subject variables was performed.

As predicted, an interaction between consistency and mood emerged, $F(2, 32) = 4.07$, $p < .05$, $\eta^2 = .20$. This interaction is illustrated in Figure 2.2. In the positive mood condition, responses to consistent trials (M = 614 ms) were faster than responses to inconsistent trials (M = 652 ms), $F(1, 34) = 5.55$, $p < .05$, $\eta^2 = .17$. No effect was obtained in the neutral mood condition (M = 639 ms and M = 666 ms for the consistent and inconsistent trials), $F(1, 34) = 2.27$, *ns*. In the negative mood condition no difference was found between consistent (M = 707 ms) and inconsistent trials (M = 680 ms) either, $F(1, 34) = 1.84$, *ns*. No other effects were found in this analysis, p's > .10. Simple effect tests revealed that the positive and negative mood condition differed from each other on consistent trials, $F(1, 22) = 4.95$, $p < .05$, $\eta^2 = .19$, but not on inconsistent trials, $F < 1$. All other comparisons were not significant, p's > .13.

The mood manipulation thus affected the consistent trials (slower reaction times in the negative mood condition compared to positive mood conditions) and not the inconsistent ones. Theoretically, one would expect this effect to be due to variations in negative affect. The manipulation check showed, however, no significant effects on the two affect scales, which may be ascribed to the fact that they were administered about 15 minutes after the manipulation. By that time, the effects of the mood manipulation may have completely

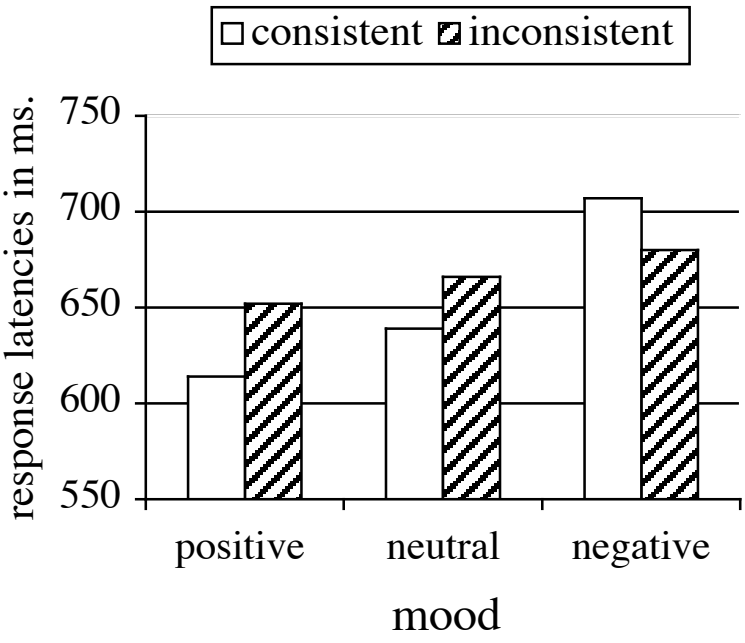

Figure 2. 2. Mean response latencies on the consistent and inconsistent trials of the EAST of Study 2.2 as a function of mood.

drained away. Regressing the mood measures on the EAST effect did not show any effects either. In order to establish the exact mood effects of our manipulation, a small pilot study (N = 35) was conducted. Participants watched one of the three clips and immediately afterwards filled in the mood questionnaire. The results showed that the film-clips we used had an impact both on positive affect, (Ms = 3.00, 2.53 and 1.61 for the positive, neutral and negative mood condition respectively), $F(2, 34) = 13.83$, $p < .001$, $\eta^2 = .35$, and on negative affect (Ms = 1.13, 1.33 and 3.28 respectively), $F(2, 34) = 31.83$, $p < .001$, $\eta^2 = .67$, but the latter effect seemed stronger. A test of the interaction of mood condition and affect measure (repeated measures: positive affect versus reversed scored negative affect) showed indeed that negative affect was more strongly affected by the film clips than positive affect, $F(2, 32) = 5.25$, $p < .05$, $\eta^2 = .25$. Considering these manipulation check results, it seems plausible that enhanced negative affect (rather than reduced positive affect) was responsible for the observed slowing down of reactions times in the negative mood condition. Also, consistent with the first study, no effects of valence were found. Thus, no mood congruency effects are present.

The results of Studies 2.1 and 2.2 suggest that negative mood (a danger signal) leads to a decrease of the automatic evaluation effect in comparison to decreased negative mood

(absence of a danger signal) and increased positive mood (safety signals). Furthermore, this effect seems due to slower responding to consistent trials in negative mood in comparison to decreased negative mood and increased positive mood. Although these results are insightful, these data are still indecisive as to whether responses to consistencies are inhibited in danger signal conditions. A more direct test of slower responding on consistent trials in danger signal conditions would be useful to establish the existence of an automatic caution effect. To this purpose we incorporated a baseline in an affective priming task in Study 2.3. This baseline enables us to establish the degree of facilitation or inhibition of responses to consistent and inconsistent trials in comparison to responses to neutral prime trials. Including this neutral baseline may provide more direct evidence for inhibition on consistent trials when receiving danger signals in comparison to safety signals. Furthermore, instead of using mood, in this study we subliminally presented happy or sad faces as a manipulation of safety and danger signals respectively. A neutral expression condition was not included because in Study 2.2 no differences between the positive and neutral mood conditions were found.

Study 2.3

Method

Overview

Participants first practiced one block of the affective priming task. Then, subliminally presented happy or sad faces served as between-subjects manipulation of safety versus danger signals. After this presentation the critical trials of the affective priming were administered.

Participants

Thirty-seven students (7 men and 30 women) of the Radboud University Nijmegen participated in return for 2 euros. The data of three participants were not included in the analyses as they did not follow instructions properly. In total the data of thirty-four participants were included in the analyses.

Manipulation

We manipulated safety and danger signals by using sad and happy facial expressions. The happy or sad faces were subliminally presented using an adjusted version of a method used by Winkielman, Berridge and Wilbarger (2005). Subliminal expressions were embedded in a gender-classification task. Participants indicated the gender of neutral faces by pressing one of two keys. Each trial started with a forward mask (black rectangle) displayed for 50 ms. This mask was followed by a subliminal prime (happy or sad expression) for 16 ms, which was replaced by a backward mask (neutral male or female face). The task consisted of eight trials with either all happy or all sad subliminally presented faces.

The stimuli used were 8 neutral, 8 happy and 8 sad faces. The neutral faces served as backward masks and as target stimuli, whereas the happy and sad faces only served as primes. Half of the faces used were men and half were women. All pictures came from the Karolinska Directed Emotional Faces (KDEF; Lundqvist, Flykt, & Öhman, 1998). The images were 5,29 cm x 7,16 cm, in gray scale and presented centrally on the monitor. The refresh rate of the monitor was set to 75 Hertz.

Procedure

Upon arrival in the laboratory participants were seated in separate cubicles and were told they would participate in a study on task switching. The participants first started with the instructions and a practice block of the affective priming task, which was used to measure the automatic evaluation effect. The affective priming task used in this study was identical to that used in Study 2.1, with the exception that we now used a neutral prime baseline. Instead of only using positive and negative object primes, we also incorporated letter strings (e.g., bbbb) as primes (see Fazio et al., 1986). Using this baseline enabled us to calculate the amount of facilitation or inhibition of consistency (e.g., flower and nice) and inconsistency (e.g., flower and mean).

The positive and negative adjectives used were similar to the adjectives used in Study 2.1. We used a subset of the attitude objects used in Study 2.1, including 4 positive objects, 4 negative objects and 2 letter strings were used as primes instead of 5 positive objects and 5 negative objects. Each block of the affective priming task consisted of 20 trials presenting all primes twice, once paired with a positive target and once with a negative target.

After the first block the gender classification task, in which either happy or sad faces were subliminally presented, was administered. Directly after finishing this task participants

continued with the critical trials of the affective priming task. The allocation of valence to response key was counterbalanced between participants. When finished with this block, the participants completed the mood questionnaire as used in Study 2.1 and 2.2. However, instead of using a 5-point scale we now used a 9-point scale.

Results and discussion

As in Study 2.1 and 2.2 reaction times below 300 ms and above 3000 ms were set equal to respectively 300 ms and 3000 ms. Also error responses (mean rate = 5.6%) were removed. The mean reaction times of the positive prime-positive target, positive prime-negative target, negative prime-negative target and negative prime-positive target trials were calculated. Also the mean reaction times of the neutral prime-positive target and the neutral prime-negative target trials were calculated. Then facilitation scores were computed. First the mean of the positive prime-positive target trials was subtracted from the mean of the neutral prime-positive target trials. This score then reflects the positive consistent trials. The same was done for the negative prime-positive target trials, which reflect the positive inconsistent trials. Also, the mean of the negative prime-negative target trials was subtracted from the mean of the neutral prime-negative target trials. Again the same was done for the positive prime-negative target trials. These scores are respectively the negative consistent trials and the negative inconsistent trials

In order to test the hypothesis a 2(consistency: consistent vs. inconsistent) x 2(valence of the target: positive vs. negative) x 2(facial expression: happy vs. sad) analysis of variance with consistency and valence as within-subject variables was performed on the facilitation scores. The analysis revealed, as expected, a facial expression x consistency effect, $F(1,32) = 5.09$, $p < .05$, $\eta^2 = .14$[2]. In Figure 2.3 this interaction is shown. In the happy expression condition more facilitation of consistent trials ($M = 19.67$, SD = 101.52) than of inconsistent trials ($M = -19.61$, SD = 96.22) was found, $F(1,33) = 5.82$, $p < .05$, $\eta^2 = .18$. In the sad expression condition no difference emerged between the amount of facilitation of consistency ($M = -35.39$, SD = 69.22) and of inconsistency ($M = -20.87$, SD = 83.02), $F < 1$. Simple effect tests revealed that the happy expression condition and the sad expression condition differed marginally on consistent trials, $F(1,32) = 3.33$, $p < .08$, $\eta^2 = .09$, but not on

[2] A main efect of valence was found as well, $F(1, 32) = 5.28$, $p < .05$, $\eta^2 = .14$. Overall, responding to positive targets was slower than responding to negative targets. However, no interactions with valence of the prime and facial expression condition were found, p's > .65

inconsistent trials, $F < 1$. The main goal of this study was to establish if there is inhibition of consistent trials rather than facilitation of inconsistent trials in the sad expression condition. Indeed, in this condition the reaction times on consistency differed from the baseline, $t(15) = -2.14$, $p < .05$. Specifically, responding to consistency was slower than responding to the neutral prime trials suggesting inhibition of responding to consistency. Responses on inconsistency were not slower than the neutral baseline, $t(15) = -1.04$, *ns*. Neither were responses to consistency and inconsistency in the happy expression condition, p's > .39.

In order to test whether the manipulation of happy and sad facial expressions influences explicit reports of mood an ANOVA on both the positive and negative mood questions was conducted. The facial expression condition did not influence reports of positive affect, $F < 1$. The presentation of happy faces did not lead to more positive feelings (M = 6.25, SD = 1.07) than the presentation of sad faces (M = 6.13, SD = 1.35). Facial expression did not influence reports on negative affect either, $F < 1$. Subliminally presenting sad faces did not lead to reporting more negative feelings (M = 2.66, SD = 1.96) than presenting happy faces (M = 2.94, SD = 1.96).

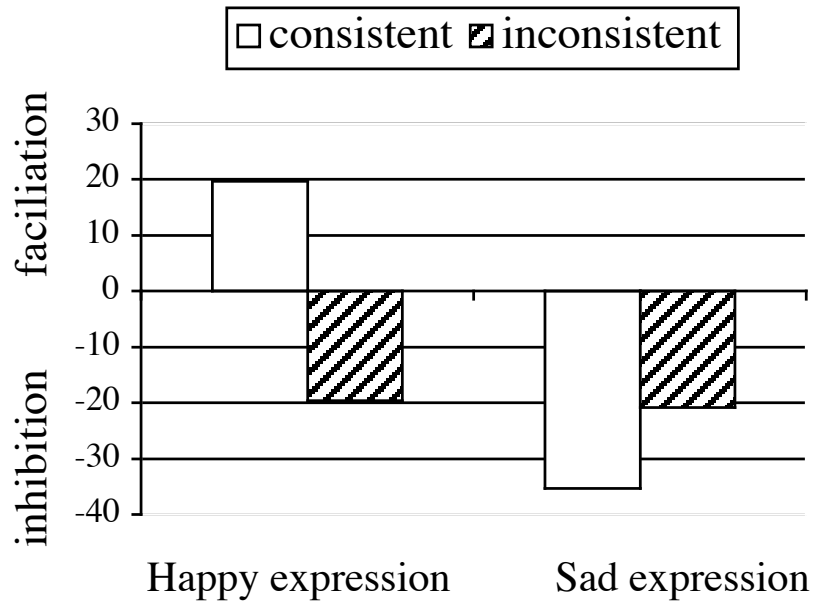

Figure 2.3. Mean facilitation and inhibition of responding to the consistent and inconsistent trials of the affective priming task of Study 2.3 as a function of facial expressions.

In line with Study 2.1 and 2.2, exposure to happy facial expressions (a safety signal) led to the automatic evaluation effect, while in the negative expression (a danger signal) condition no automatic evaluation effect was found. More importantly, this study enabled us to compare latencies of consistency and inconsistency with a baseline, leading to a direct test of inhibition of consistency in the sad expression condition. Indeed it was found that exposure to sad facial expressions led to inhibition of consistency in comparison to a baseline. Furthermore, in the happy facial expressions condition both facilitation of consistency and inhibition of inconsistency have a contribution to the automatic evaluation effect. As in studies 2.1 and 2.2 no interactions with valence were found.

The presentation of happy or sad facial expressions did not influence participants reported mood. This finding is consistent with other studies on the influence of subliminally presented facial expressions on information processing (e.g., Soldat & Sinclair, 2001) and consumption behavior (Winkielman, et al., 2005). This suggests that affective cues (like facial expressions) can affect information processing without eliciting the experience of positive or negative mood.

General discussion

The present studies demonstrate that safety and danger signals, i.e. signals that indicate whether the environment is benign or problematic, influence the automatic responding to evaluative stimuli. In general the studies showed that automatic evaluation processes were observed in safety signal conditions, but not within danger signal conditions. Study 2.1 revealed that natural occurring differences in negative affect were associated with the strength of the automatic evaluation effect. As levels of negative affect increased, the automatic evaluation effect was reduced. Study 2.2 employed a mood manipulation, which particularly affected negative affect, and revealed a stronger automatic evaluation effect in the positive mood condition than the negative mood condition. Finally, in Study 2.3, the results of Study 2.1 and 2.2 were replicated, using a quite different manipulation of safety and danger cues. In that study we employed the subliminal presentation of happy and sad facial expressions. Paralleling mood effects, subliminal exposure to happy faces during a preliminary stage of the experiment, i.e. before the automatic evaluation task, resulted in a stronger automatic evaluation effect compared to subliminal exposure to sad faces. Together,

these three studies provide ample evidence that safety and danger signals moderate the automatic evaluation effect.

On first sight, our research may be added to a list of contextual influences on the automatic evaluation effect (e.g., Ferguson & Bargh, 2004; Mitchell, et al., 2003; Wittenbrink et al., 2001; for an overview see Blair, 2002). However, our research differs from previous approaches on contextual influences in a crucial way. Whereas previous studies obtained evidence that the evaluation of a specific attitude object may change as a function of the context, we focused on contextual influences that change automatic evaluation processes in general. In other words, our context effects are expected to influence the subsequent evaluation process of all kinds of attitude objects, rather than a specific attitude object.

Automatic caution

The goal of the present research was, however, not only to show that safety and danger signals affect automatic evaluations. The current data also speak to the processes that underlie this effect. We expected that the effects of safety and danger signals on automatic evaluation processes would be mainly due to cautious processing of evaluative stimuli in danger signal conditions. The data seem in line with this hypothesis. The three studies consistently showed that our effects were mainly due to slower reactions to consistencies (positive - positive and negative - negative trials) of participants in danger situations. Study 2.1 showed that levels of negative affect were positively related to reaction times on consistent items in an affective priming task. Similarly, Study 2.2 revealed that participants in the negative mood condition responded slower to consistencies compared to participants in the positive mood condition. Finally, in Study 2.3 we were able to investigate the nature of the cautious processing more directly, by adding a baseline in the affective priming task. This study revealed that danger signals elicit slower responding to consistency in comparison to a neutral baseline. In other words, it took respondents even longer to indicate the evaluative nature of an adjective (e.g., bad) when it was preceded by an evaluatively consistent attitude object (e.g., cockroach), compared to responding to the same adjective preceded by a neutral object.

Thus, the effects obtained in these studies may be primarily ascribed to the influence of danger signals on consistent trials. Danger signals enhance people's need to avoid errors (Fiedler, 2001). These signals, therefore, evoke a tendency to resist reacting quickly to

consistent items, because of the risk inherent in relying on spontaneous associations. We have dubbed this tendency the automatic caution effect. Specifically, danger signals seem to lead to automatic caution diminishing the automatic evaluation effect.

Mood and automatic processing

The present studies have implications for understanding mood influences on information processing in general. Most studies within this domain focused on the influence of mood on heuristic versus deliberative processes in making judgments. Various accounts have been provided for the link between mood and processing style. For example, some scholars have argued that positive mood may reduce processing capacity (Mackie & Worth, 1989), by which analytic processing is impaired. Others have argued that positive mood reduces the motivation to process information (Schwarz, 1990; Wegner & Petty, 1994). However, given the fact that mood had no main effect on reaction times, capacity and motivation cannot account for the present findings.

Our results are more in line with the idea that mood may alter the reliance on general knowledge structures (e.g., Bless & Schwarz, 1999). As Bless and colleagues illustrated, a negative mood state causes individuals to abandon reliance on general knowledge structures and routines such as scripts and heuristics (and subsequently enhances systematic information processing). Participants in negative mood states abandon reliance on automatic evaluations that come to mind. Interestingly, the present findings suggest that such abandoning of reliance can be very quick and automatic. Therefore we refer to this effect as automatic caution. When there is an imminent threat of danger in a situation, we automatically inhibit responses that seem natural to do.

Implications

Attitude-behavior relations

The present findings may have important implications for the influence of attitudes on behavior. Recently, several studies have shown that implicit measures of attitudes, i.e. measures based on automatic evaluation processes, are related to behavior (e.g., Bessenoff & Sherman, 2000; Chen & Bargh, 1997; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Neumann, Hülsenbeck, & Seibt, 2004). The current findings of the present research

suggest that the relation between automatic evaluation and behavior may be qualified by safety or danger signals. Automatic caution induced by diffuse negative affect, or other danger signals, may inhibit behavioral responses based on automatic evaluations, whereas safety signals may facilitate the link between automatic evaluations and behavior. Indeed, we (Hermsen, Holland, & Van Knippenberg, 2006b) recently conducted a series of studies showing that automatic caution has also implications on the relation between attitudes and actual overt behavior. These studies revealed that diffuse positive affective states facilitate the link between implicit attitudes and behavior, while diffuse negative affective states seem to reduce the relation between automatically activated attitudes and behavior.

Interestingly, other results showed that in negative mood states individuals tend to reflect on their beliefs about the object when asked for their attitudes (Hermsen, Holland, & van Knippenberg, 2004). That is, a belief measure according to expectancy value models (e.g., Fishbein, 1967) is strongly related with attitude measure in negative mood, but not in positive mood. This reliance on beliefs in negative mood subsequently influences behavior. Thus in negative mood behavior is regulated by belief-based attitudes, rather than automatic evaluations (Hermsen, Holland, & van Knippenberg, 2006b). In other words, within negative mood states behavioral choices were more likely influenced by cost-benefit analyses (see e.g., Ajzen & Fishbein, 1977). These findings seem consistent with the present automatic caution account. People in negative mood states tend to resist acting according to their automatic evaluations. Their cautious processing style may furthermore be conducive to elaborate processing and strengthen the link between belief-based attitudes and behavior.

Mood congruency

The present studies also have implications for the literature on mood congruency or mood compatibility. For example, according to Bower (1981), positive mood individuals would more easily respond to positive information than to negative information and vice versa for negative mood individuals. Also, Strack and Deutsch (2004) suggest that mood may possibly tune a person towards approach (in positive mood states) and towards avoidance (in negative mood states). However, such compatibility effects were not obtained in our three studies. Specifically, differences in speed of reactions to positive consistencies (e.g., party – great) compared to negative consistencies (e.g., cancer – mean) were unrelated to mood state (and also to the facial expression manipulation). Instead, our research showed that *both* positive consistencies and negative consistencies were facilitated in positive mood states, and *both*

types of consistencies were inhibited in negative mood states. Thus, our results counter the idea that diffusive affective states influence automatic evaluative processes because of enhanced accessibility of mood congruent material in memory. Instead, as we have argued, we think that diffuse negative mood states (and other danger signals) result in a cautious processing style and therefore slow down consistent responses irrespective of the valence of the response.

Of course, effects of mood compatibility have been shown in several studies (Clark & Waddell, 1983; Forgas & Bower, 1987; Singer & Salovey, 1988). Congruency or compatibility effects can be expected when, for example, individuals take ample time to come up with a judgment. In such slow judgments situations, mood may 'infuse' (see Forgas, 1995) the judgments, by selectively activating mood congruent material. Low affect infusion is expected when processing involves low elaboration and pertains to the retrieval of a preexisting evaluation. In sum, mood compatibility effects may enter slow analytical judgments, but not automatic responses such as the automatic evaluation effect (see also Itoh, 2001; Tamir & Robinson, 2004).

Beyond automatic evaluation?

The present studies also have implications for research on the effects of cognitive tuning on non-evaluative judgments, such as the use of stereotypes, scripts and other heuristics. Considering established effects of safety and danger signals (mood and also happy and sad facial expressions) on such judgments in light of the current research, it may be argued that they have been partly due to automatic processes. It may be of interest to study the role of automatic processes in the way signals influence heuristic processes, such as stereotype use (e.g., Bodenhausen et al., 1994), scripts (Bless et al., 1996), or persuasion by peripheral cues (Bless et al., 1992). Extending the work to the processing of other (non-evaluative) information may be a fruitful direction for further research.

Diffuse versus specific emotions

Our theorizing and experiments were built on the important distinction between safe and unsafe environmental cues. That is, we focused on the influence of positive and negative affective states and positive and negative facial expressions which induce a diffuse signal of

safety or danger. The signals are related to the environment in general rather than a specific object in the environment. For example, the mood states and the negative facial expressions signal that the environment may be problematic. However, the nature of the problem has not been identified. Therefore, it is adaptive to adopt a cautious processing style. When the threat in the environment is clear, one might argue that it is not particularly efficient to inhibit automatic responding. Indeed, it seems more useful to run away when you see an approaching lion than to cautiously reconsider behavioral options. In these cases, the environment poses a specific and clear threat, which is quite different from the diffuse affective and non-affective safety and danger signals that were studied in the present experiments.

Conclusions

In the present research we observed that safety and danger signals affect the automatic evaluation effect. In danger signal conditions no automatic evaluation effect was found in contrast to safety signal conditions. Additionally it was established that danger signals slow down responses to consistent stimuli presumably due to what we have called an automatic caution effect. These findings suggest that safety and danger signals (like mood and facial expressions) can exert influence on automatic processes. Thus, the present results contribute to insights into the influence of safety and danger signals specifically on the automatic evaluation effect in specific and, more generally, on automatic responding to the environment.

Chapter 3

The happy act on impulse, the sad think twice: Mood as moderator of the impact of implicit and explicit attitudes on behavior*

Consider the following fairly plausible story: In a somewhat ponderous mood you come to think that it is very important to stay healthy and therefore you decide that from now on you will only eat healthy food and stay away from sweets. The next day you are walking down the street. The sun is shining and you are in a joyful mood. As you are passing a small kiosk a display of chocolate bars catches your eye and you can't resist the temptation to buy one. When you're half way through the candy bar you suddenly realize that you weren't supposed to eat sweets anymore. Still, here you are chewing away the forbidden fruit. At this point you wonder what happened to your resolution not to eat sweets anymore.

It seems that in a person different mental systems may be involved in the regulation of decisions and behavior. The resolution to eat only healthy food was made in a deliberative state of mind, while elaborating on the positive and negative aspects of healthy food and sweets. This thoughtful elaboration culminated in an explicit positive attitude towards healthy food and an explicit negative attitude towards sweets. The next day, however, in more sunny circumstances, an intuitive system took control. Upon seeing the chocolate bars, your automatic positive evaluation of sweets immediately made your hand go for your purse. Without considering the pros and cons, you simply bought a chocolate bar on impulse.

The aim of the present research is to demonstrate that depending on the currently dominant frame of mind, deliberative versus intuitive, either belief-based or implicit attitudes, guide behavior. More specifically, we aim to demonstrate that negative affect, which is believed to induce a relatively deliberative processing style, results in a strong relation between belief-based attitudes and behavior. Positive affect, facilitating a more intuitive processing style, is expected to enhance the impact of implicit attitudes on behavior.

* This chapter is based on Hermsen, Holland & van Knippenberg (2006b)

Deliberative versus intuitive processing system

The idea of two different information processing systems operating within a person is posited by several theories on self-regulation (e.g., Kuhl, 2000; Strack & Deutsch, 2004; Schwarz, 2002). This tenet constitutes the core of most dual process theories in social psychology (Chaiken & Trope, 1999). Put briefly, the processing style in one system may be characterized as deliberative or reflective, while the processing style in the other system may be characterized as intuitive or impulsive. The deliberative or reflective system is designed for serial and analytical processing (Kuhl, 2000). Within this system, decision processes are based on weighing knowledge about the value and probability of consequences of the decision or behavior (Strack & Deutsch, 2004). As a consequence this system is slow and limited in terms of the amount of information it can handle (Dijksterhuis, 2004). The intuitive or impulsive system, on the other hand, is thought of as an associative network, in which elements are linked through simple associations (cf. Kuhl's, 2000, extension memory). Activation of one element leads to spreading activation to other elements, including behavioral schemata (Strack & Deutsch, 2004). Within this system, information is processed in a holistic, parallel and fast manner. In order to be able to predict behavior, it is of crucial importance to understand the basic regulatory mechanisms that determine which system guides behavior in a specific situation.

Cognitive tuning to situational requirements

William James (1890) noted that "My thinking is first and last and always for the sake of my doing" (p. 333) Thus, according to James, cognitive processes are in the service of action. For adaptive responses to the environment, our cognitive processing style should be tuned to the requirements of the situation (Schwarz, 2002). The nature of such cognitive tuning processes can be illustrated by comparing problematic with benign situations. When things go smoothly and nothing impedes us from attaining our goals, we are likely to rely on routines that served us well in the past. Once things become problematic, however, reliance on these usual routines is abandoned and we focus on the specifics at hand to determine the nature of the problem to see what can be done about it. When things go wrong the perception of our actions and the context in which we perform these actions are represented at a greater level of detail compared to situations in which everything runs smoothly (see also Wegner & Vallacher, 1986).

How do we know when things go wrong or smoothly? Sometimes we get specific feedback on our actions from situational cues (e.g., a flattering remark from a colleague, or alarm bells in a nuclear plant after having pushed the wrong button). However, such signals may also be derived from more diffuse sources such as bodily feedback (e.g., Friedman & Forster, 2000), smiling or frowning faces (e.g., Ottati, Terkildsen, & Hubbard, 1997) and diffuse affective states (e.g., Schwarz, 1990). The present paper is concerned with the latter.

The nature of the situation we are in, either problematic or smooth, is often signaled by affective states. Usually, when things go wrong we feel bad. On the other hand, when things go well, we mostly feel good. Thus, the state of the environment (benign or problematic) may be reflected in diffuse positive or negative affective states. These affective states, then, serve as safety or danger signals (see e.g., Bless & Schwarz, 1999; Chartrand, Bargh, & van Baaren, in press; Kuhl, 2000; Kuhl & Koole, 2004; Schwarz, 1990; Wyer, Clore, & Isbell, 1999). Negative affect informs the organism that the environment is problematic or hostile and that it is necessary to mobilize energy to face the problems at hand. An adaptive manner of responding to such potential problems is to adopt a detailed and analytic information processing style. Positive affect informs the system about benign environmental conditions. It signals that there are no threats in the direct situation and that it is business as usual. It may be worthwhile, then, to adopt an intuitive processing style and to maintain a broad view in order to be ready to reap the benefits the situation may offer. There is no apparent need to shift to effortful processing, as a more intuitive, associative way of processing suffices in this situation.

Thus, several theories on affect and information processing suggest that positive and negative affect may modulate the up- and down-regulation of the intuitive and deliberative system (Kuhl, 2000; Smith & DeCoster, 2000; Schwarz, 2002). Empirical evidence for the influence of affect on information processing is abundant. Generally negative mood leads to more systematic and deliberative information processing than positive mood. For instance, it has been shown that, compared to positive mood, negative mood leads to a decreased use of stereotypes (e.g., Bless, Schwarz, & Wieland, 1996; Bodenhausen, Kramer, & Süsser, 1994), the ease of retrieval heuristic (Ruder & Bless, 2003), scripts (e.g., Bless, Clore, Schwarz, Golisano, Rabe, & Wolk, 1996) and peripheral cues (Bless, Mackie, & Schwarz, 1992; Schwarz, Bless, & Bohner, 1991). Also, negative mood individuals have been found to be more strongly persuaded by strong rather than weak arguments (Bless, Bohner, Schwarz, & Strack, 1990), indicating a more analytic processing style. Fiedler (1988) showed that being

in a sad mood fosters performance on analytic reasoning tasks. On the other hand, it has been found that positive mood persons perform worse on analytic tasks than neutral mood persons (Melton, 1995). Furthermore, evidence that mood affects the extent to which people intuitively respond to their associations is accumulating as well, implying more reliance on one's associative network. That is, in a positive mood individuals tend to be more associative than in a neutral or negative mood (Bolte, Goschke, & Kuhl, 2003; Hänze & Hesse, 1993; Hermsen, Holland, & Van Knippenberg, 2006a; Isen, Johnson, Mertz, & Robinson, 1985). For instance, positive mood increases the number of unusual word associations given in response to neutral stimuli (Isen et al., 1985).

Together, there is ample evidence suggesting that negative mood facilitates cautious and deliberative processing, while positive mood fosters intuitive processing. These ideas have been mainly tested within the domain of judgments. In the present paper, we argue that mood may also moderate whether behavior is regulated by deliberative or intuitive processes. Interestingly, such differences in processing style as a function of mood, may potentially bridge two different views on the basic processes underlying the relation between attitudes and behavior.

From attitudes to behavior: automatic versus deliberative processes

Within the literature on attitude-behavior consistency, two distinct processes can be discerned by which attitudes may influence behavior. One process involves the influence of implicit attitudes on behavior. This line of research was inspired by the work of Fazio, Sanbonmatsu, Powell, and Kardes (1986) on the automatic activation of attitudes upon perceiving an object in the environment. They showed that the presentation of an attitude object (e.g., chocolate bar) facilitates responding to an evaluatively congruent word (e.g., great) that is presented immediately after the attitude object, and it slows down responses to a word that is evaluatively inconsistent (e.g., terrible). Since then, the automatic evaluation effect has been replicated in a great number of studies with a variety of paradigms (e.g., Bargh, Chaiken, Govender, & Pratto, 1992; Greenwald, McGhee, & Schwartz, 1998; Hermans, Spruyt, & Eelen, 2003, see for an overview Fazio, 2001). Findings on the automatic evaluation effect stimulated the development of implicit attitude measures, which are thought to measure global attitudes that are activated automatically upon perceiving an object. These implicit attitude measures include for instance the bonafide pipeline (Fazio, Jackson, Dunton, &

Williams, 1995), the Implicit Association Task (IAT; Greenwald et al., 1998) and variants of the IAT, such as the personalized IAT (Olson & Fazio, 2004b) and the single target IAT (Wigboldus, Holland, & van Knippenberg, 2006).

The automatic activation of attitudes will, in our view, occur always when encountering an object. The fact that automatic evaluation effects have been observed using various different tasks, including subliminal presentation of the attitude object (e.g., Greenwald, Draine, & Abrams, 1996; Greenwald, Klinger, & Liu, 1989; Wittenbrink, Judd, & Park, 1997) provides support for this assumption. Furthermore, several studies in the domain of cognitive neuroscience have shown that automatic attitude activation is accompanied by activation of the amygdala (Cunningham, Johnson, Gatenby, Gore, & Banaji, 2003; Cunningham, Raye, & Johnson, 2004), an area in the brain that is assumed to be involved in immediate, preconscious responses to stimuli. (e.g., Fellous & LeDoux, 2005; Phelps, O'Conner, Gatenby, Gore, Grillon, & Davis, 2001). Interestingly, also implicit attitude measures such as the IAT have been found to correlate with the strength of amygdala activation (Phelps, O'Connor, Cunningham, Funayama, Gatenby, Gore, & Banaji, 2000). Amygdala activation has been shown to occur whenever an object is perceived, even without instructions to evaluate (Cunningham, et al., 2004).

Automatic attitude activation upon encountering an object may shape subsequent behavior. The attitude-behavior route may follow an intuitive process such that individuals may not even be aware of the attitudinal influence on behavior (Fazio, 1990; Fazio & Towles-Schwen, 1999). That is, upon perceiving an object in the environment the global evaluation of this object is activated automatically and outside of awareness (e.g., Fazio et al., 1986). The activated attitude will then guide approach-avoidance tendencies, either by spontaneously altering the perception of the attitude object (e.g., Fazio, 1990) or by directly activating approach-avoidance motor programs (Chen & Bargh, 1999, see also Strack & Deutsch, 2004). Thus, the processes underlying the link between automatic attitude activation and behavior fit in with the features of the intuitive system, which is described as an associative network enabling activation of one element (e.g., evaluation) by the activation of another (e.g., attitude object), including behavioral schemata. Indeed, implicit attitudes have been found to predict behavior in numerous studies, employing a variety of implicit attitude measures (e.g., Asendorpf, Banse, & Mücke, 2002; Bessenoff & Sherman, 2000; Dovidio, Kawakami, & Gaertner, 2002; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997; Fazio, et. al, 1995; McConnell & Liebold, 2001; Neumann, Hülsenbeck, & Seibt, 2004;

Sekaquaptewa, Espinoza, Thompson, Vargas, & Von Hippel, 2003; Wilson, Lindsey, & Schooler, 2000; for an overview see Fazio & Olson, 2003).

Contrary to attitudes that are automatically activated upon perceiving an attitude object, explicit, belief-based attitudes are only formed in specific conditions. While automatic evaluation is associated with amygdala activation, attitude formation based on more deliberative processing results in activation of prefrontal areas (Cunningham et al., 2003; Cunningham et al., 2004). In general it is believed that the prefrontal cortex is involved in higher order cognition, such as deliberative or reflective processing (e.g., Duncan & Owen, 2000). Thus automatic evaluations are activated upon perceiving an object, while in specific instances (e.g., ambivalence of the attitude), attitudes are based on more deliberative processes as well. In the latter case a richer mental representation is used for forming an attitude. Knowledge about attributes of the attitude object then becomes accessible and is weighted to form the attitude.

Attitudes that are formed on the basis of deliberative information processing have beliefs as their main source. Theories about these belief-based attitudes are mainly based on expectancy value models (e.g., Fishbein, 1967). In these models, attitudes are assumed to depend on the expectancy and evaluation of various behavioral outcomes. For example, the attitude towards eating a chocolate bar may be influenced by several specific outcome expectancies, (e.g., such as the likelihood of gaining weight, undermining health, tasting great, etc.) and by the evaluation of these outcomes (e.g., gaining weight is bad, undermining health is even worse and tasting great is good). The formation of such belief-based attitudes is typically a deliberative process, based on the assumption that individuals are rational and elaborate on available information (Ajzen, 2001; Ajzen & Fishbein, 1977; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press).

According to the latter perspective, the attitude-behavior process involves the analysis of the positive and negative features of the object, the scrutiny of specific attributes of the attitude object and the elaboration of potential consequences of the behavior. Such elaboration will then eventually lead to behavior towards the object. The best-known models in this regard are probably the theory of reasoned action (Ajzen & Fishbein, 1977), and the theory of planned behavior (Ajzen, 1985; Ajzen, 2001; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press). Although recently it has been opted that beliefs can be spontaneously activated as well (Ajzen, 2001), the presumed process of the attitude-behavior relation is

most consistent with the features of the deliberative system, i.e. analytical and elaborative scrutiny of information resulting in conscious intentions and subsequent behavior.

To summarize, attitudes may influence behavior as a result of either a deliberative or an intuitive process. For individuals in a deliberative frame of mind, belief-based attitudes are more likely to predict behavior, whereas for individuals in an intuitive frame of mind, implicit measures of attitudes can be expected to predict behavior. Although there is ample empirical evidence for both processes to mediate attitude-behavior relations, the conditions that moderate the nature of these processes are not well known. One factor that may influence the predictive value of attitude type on behavior is intentionality of the behavior. It has been found that implicit measures predict unintentional behavior (Asendorpf, et al., 2002; Dovidio, et al., 2002). Unintentional behavior refers to behavior that is executed without conscious intent, it tends to occur spontaneously and automatically, such as the interpersonal distance one maintains during a conversation. Explicit measures often predict intentional behavior, i.e. behavior that is consciously executed to reach a specific goal. This behavior tends to be more deliberative in nature. Other factors relevant for the role of implicit versus explicit attitudes have been put forward by Fazio's MODE model (Fazio, 1990), i.e. opportunity to deliberate and motivation to deliberate. In the General Discussion (Chapter 4), we elaborate on how the present work may fit in with the MODE model. Below we focus on mood as a potentially important moderator of attitude-behavior processes.

The Present Research

The present research aims to demonstrate that mood influences how attitudes translate into behavior. Because diffuse affect plays a modulating role in the up- and down-regulation of the deliberative and the intuitive system, we propose that mood moderates whether behavior is influenced by scrutinizing the costs and the benefits of the behavior or by intuitive attitudinal processes.

Positive affect is expected to elicit reliance on intuitive processing and therefore on implicit attitudes. As a result implicit attitudes will predict behavior in positive mood. The relation between belief-based attitudes and behavior, however, will be weak or absent in positive mood, because a positive mood is not conducive of systematic, analytical processing of information required for the construal of belief-based attitudes.

In negative mood the relation between implicit attitudes and behavior is thought to be weak. Recent research has shown that mood influences the automatic evaluation effect (Hermsen, et. al, 2006a). The automatic evaluation effect includes faster responses to attitude-congruent word combinations (e.g., flower and good) and slower responses to attitude-incongruent word combinations (e.g., flower and bad). Interestingly, in these studies it was found that negative mood leads to a decrease of the automatic evaluation effect in comparison to positive mood. This effect could be fully ascribed to slower responses to attitude-congruent word pairs in negative mood compared to positive mood. Hermsen et al. (2006a) suggest that negative mood elicits a cautious style of information processing, in which emphasis is placed on avoiding errors and, because responding quickly on the basis of spontaneous attitudes is error prone, responses to these spontaneous attitudes are impeded.

Thus, negative mood individuals rely less on implicit attitudes. Therefore, the relation between implicit attitude measures and behavior in negative mood can expected to be weak. On the other hand, negative affect is conducive of deliberative processing, which enables one to scrutinize beliefs about the attitude object when behavior towards the object is called for. Therefore in negative mood the relation between belief-based attitudes and behavior is expected to be strong.

The present research will also be concerned with the nature of the behavior involved. The effects of implicit and belief-based attitudes on both intentional and unintentional behavior are investigated. Generally it is thought that implicit attitudes predict unintentional behavior more strongly than intentional behavior, while explicit attitudes are more likely to predict intentional behavior, rather than unintentional behavior (e.g., Dovidio, et al., 2002). We aim to show that automatically activated attitudes can predict intentional as well as unintentional behavior under positive mood. Belief-based attitudes, however, only predict intentional behavior under negative mood, but not unintentional behavior. In Study 3.1 unintentional approach-avoidance behavior towards billposters of two political parties is measured. In Study 3.2, behavior is assessed that has both unintentional and intentional aspects, i.e., the amount of information provided when filling out a form. Intentional choice behavior between an apple and a candy bar is measured in Studies 3 and 4.

Our expectations regarding mood and attitude-behavior processes are based on the assumption that negative mood leads to deliberative processing, while positive mood elicits intuitive processing. Insight in the presumed process underlying the influence of mood on attitude-behavior relations will be provided in the current research. More specifically, in

negative mood decision latencies are longer than in positive mood, suggesting more elaboration preceded the behavior in negative mood than in positive mood. This process measure is assessed in Study 3.3.

Study 3.1

Method

Overview

In a first session we measured participants' implicit and explicit preferences for two political parties. Two weeks later, participants returned to the laboratory and positive or negative mood was induced by means of a video clip. After the mood manipulation approach-avoidance behavior was measured using participants' seating proximity towards billposters of the two parties.

Participants and design

In the first session of the study forty-nine students of the Radboud University Nijmegen participated. Thirty-eight students (8 males and 30 females) returned for the second session[3]. They received 3 euros for their participation. One participant was removed from the data as this person did not take a seat in the waiting room. Participants were randomly assigned to the positive or negative mood condition. Thus, the data of thirty-seven participants was used in the analyses.

Materials

Participants' implicit preferences for two Dutch political parties, i.e., a socialist party (the PvdA) and a conservative party (the VVD), were measured by means of an Implicit Association Test (IAT; Greenwald, et al., 1998). Using two keys on the keyboard, participants have to discriminate between positive and negative adjectives as well as between two object categories, i.e., socialist and conservative party. In one critical trial block the same button is used to respond to positive adjectives and the socialist party, while the other button

[3] In the first study eleven participants failed to return for the second session. As we did not have participants' telephone number and/or e-mail address we could not notify them. In the remaining studies we did receive telephone numbers and/or e-mail addresses which enabled us to remind them to return for the second session.

is used for the conservative party and negative adjectives. In the other critical block the conservative party and positive adjectives share one button while the socialist party and negative adjectives share the other button.

The idea underlying of the IAT is that when responses to category words (i.e., the words referring to the socialist or the conservative party) share a button with evaluatively congruent adjectives, response latencies will be shorter than when responses to the category words share a button with evaluatively incongruent words. For instance, for individuals with a positive attitude towards the socialist party, responses are faster when the same button is used for positive adjectives than when the same button is used for negative adjectives. In line with this idea, the relative implicit preference for the socialist party vs. the conservative party may be calculated by subtracting response latencies in the socialist/positive and conservative/negative block from the response latencies in the socialist/negative and conservative/positive block.

In the IAT 5 positive (e.g., *nice* and *kind*) and 5 negative (e.g., *terrible* and *mean*) adjectives were used, as well as 5 words concerning the socialist party (e.g., *social* and *workers*) and 5 words concerning the conservative party (e.g., *conservative* and *entrepreneur*). Error feedback was provided when the participant gave the wrong response to a word. The word 'error' was displayed in red for 300 ms then the next word was presented.

The explicit attitude towards the socialist and conservative party was measured using four questions asking how positive and how negative participants felt about the two parties. The scales for the positive questions ranged from 1 'not at all positive' to 7 'very positive' and for the negative questions from 1 'not at all negative' to 7 'very negative'. An explicit attitude index was calculated. The score on the negative question concerning the socialist party was subtracted from the positive score of the socialist party. A similar calculation was made for the questions concerning the conservative party. Then the attitude score of the conservative party was subtracted from the attitude score of the socialist party. A positive score then implies a preference for the socialist party, while a negative score implies a preference for the conservative party.

Procedure

The study consisted of two sessions. In the first session the IAT was administered, measuring participants' implicit preference for the socialist versus the conservative party. After the IAT the explicit attitudes questions were administered. In the second session, approximately two

weeks later, mood was manipulated and the attitudinal relevant behavior was observed. Participants were seated in separate cubicles that contained a television, video and an iMac. Via the computer they received instructions how to operate the television. Two 7-minute fragments were used to induce mood. A fragment of 'Mr. Bean' was used in the positive mood condition. In the negative mood condition participants watched a fragment of 'Schindler's list'. Furthermore, in the positive mood condition participants were asked to especially pay attention to the funny parts of the clip, because afterwards questions would be asked about these parts. In the negative mood condition participants were asked to pay attention to the sad parts of the fragment, again in view of questions to be asked later. These instructions were given to make sure participants would focus on the funny and sad parts respectively, in order to make the mood manipulation more effective.

After watching the video fragment participants were asked, also via the computer, to go to the waiting room and take a seat, while the experimenter would set up the next part of the study. In the waiting room we obtained a measure of approach-avoidance behavior by having six chairs lined up along the back wall of the room. On each end of the row, there were two posters on the wall from one of the two political parties. The posters of the conservative party were on the left side of the row when standing in front of it, the posters of the socialist party were on the right side. The posters were the same size and contained only the name, the symbol and the colors of the party, e.g., no individual politicians were depicted. The distance with which the participant sat from the posters was observed and served as our behavioral measure (cf. Pochwatko, 2002).

About a minute after the participants took a seat in the waiting room, the experimenter surreptitiously noted the chosen seat and asked the participants to return to their cubicle in order to fill out a questionnaire measuring their current mood state, asking how *negative*, *sad*, *angry*, *positive*, *satisfied* and *happy* they felt (α = .92). Answers were given on a scale ranging from 1 (not at all) to 9 (very much). The questions about negative affect were reversed scored. Additionally, participants were asked if they noticed anything different or strange during the experiment in order to check whether participants were suspicious concerning the posters in the waiting room. Although some participants did mention the posters no one indicated suspicion with regard to the reason the posters were there[4]. After filling out the questionnaires participants were paid and debriefed.

[4] In total 13 of 37 participants mentioned the posters. Mood condition did not influence whether the posters were mentioned, χ^2 = .22, *df* = 1, *ns*. Furthermore, the IAT score did not influence the detection of the posters either, *B* = -.13, Wald = .14, Exp(B) = .87, *ns*.

Results

Mood manipulation check

An ANOVA on the mean of the 6 items measuring mood with mood condition (positive vs. negative) as independent variable revealed a main effect of mood, $F(1,35) = 135.65$, $p < .001$, $\eta^2 = .80$. Participants in the positive mood condition reported more positive feelings ($M = 6.19$, $SD = .31$) than those in the negative mood condition ($M = 4.50$, $SD = .54$).

Attitude-behavior link

Latencies of the trials on the IAT scoring below 300 ms or above 3000 ms were removed (0%). Reaction times of the trials on which a wrong answer was given were also removed (5.1%). The remaining latencies were log transformed. An IAT score of every participant was calculated by subtracting the reaction times of the block in which the socialist party and positive adjectives were under the same key from the reaction times of the block in which the conservative party and the positive adjectives were under the same key. A positive IAT score means then that the participant has a preference for the socialist party. Conversely, a negative IAT score means a preference for the conservative party. On average, however, participants scored either fairly neutral (IAT score around zero) or had a preference for the socialist party (IAT score above zero) ($M = 130$ ms, $t(36) = 6.39$, $p < .001$). For the index of the explicit attitude, of which a higher score indicates a more positive attitude towards the socialist party, an overall preference for the socialist party was found, $M = 3.16$, $t(36) = 4.00$, $p < .001$. Furthermore, the IAT score and the explicit attitude score correlated positively, $r(37) = .52$, $p < .01$.

In order to test our hypothesis regarding the effects of mood on the relation between implicit attitudes, explicit attitudes and behavior, a regression analysis of seating proximity, explicit attitude score and the IAT score was performed. First, the IAT score and the explicit attitude score of each participant were transformed into standardized scores and mood condition was dummy coded (-1 for the negative mood condition and 1 for the positive mood condition). Second, the following interactions were computed: IAT score x mood, explicit attitude score x mood, IAT score x explicit attitude score and IAT score x explicit attitude score x mood. Including the order of IAT blocks in the analyses did not yield effects. The regression analysis with the IAT score, explicit attitude score, mood condition and the interactions between these variables as independent variables and the seating proximity as dependent variable, first revealed that the three-way interaction between mood, implicit

attitude and explicit attitude did not reach significance, β = -.29, t (29) = -1.42, *ns*. The regression analysis was run again without this three-way interaction (Jaccard, Turrisi, & Wan, 1990) and revealed the predicted IAT score x mood interaction, β = .42, t (30) = 2.17, p < .05.

In Figure 3.1 the nature of this interaction is shown. In order to explain this interaction we used a method derived from Aiken and West (1991) to determine the statistical significance of the simple slopes in the positive and negative mood condition. Within the negative mood condition the IAT score was unrelated to seating proximity, β = -.12, t (33) = -.53, *ns*. In the positive mood condition, however, the IAT was positively correlated with seating proximity such that the stronger the preference for the socialist party the closer the participant sat to the poster of the socialist party, β = .54, t (33) = 2.31, p < .05.

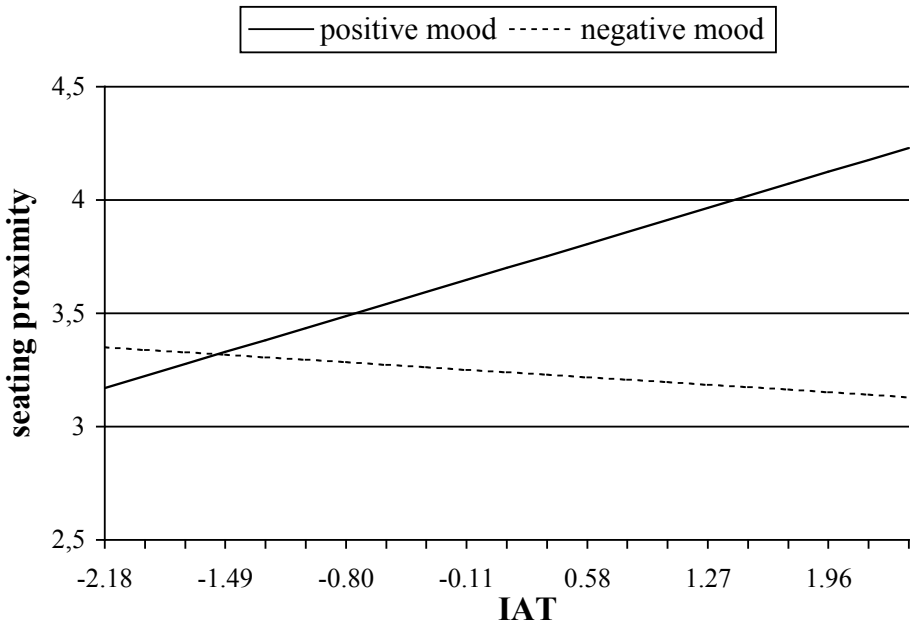

Figure 3.1. Seating proximity as a function of the standardized IAT scores for the positive and negative mood conditions. A positive IAT score implies a preference for the socialist party; a negative IAT score implies a preference for the conservative party. The higher the seating proximity score the closer the participants sat to the poster of the socialist party, Study 3.1.

The interaction between mood and explicit attitude did not reach significance, β = -.14, t (30) = -.71, *ns*. Thus, in a negative mood the explicit attitude measure did not predict behavior better than in positive mood. No other effects were found (p's > .16).

Discussion

The results from this first study suggest that, as predicted, in a positive mood people tend to behave according to their implicit attitudes, while in a negative mood these implicit attitudes have no influence on behavior. However, the explicit attitude measure neither predicted behavior in the negative nor positive mood condition. The behavior observed in this study was seating distance from posters of two political parties, which seems clearly unintentional. In other words, participants most likely did not deliberately choose to sit closer to one of the posters. Presumably, this was the reason why the explicit measure did not influence the behavior, as explicit attitude measures in general do not predict unintentional behavior (e.g., Dovidio et al., 2002).

Study 3.2

Study 3.2 was designed to replicate the effect of the implicit attitude on behavior in positive mood, using a different attitude object -- blood donation -- and, correspondingly, a different behavior. Furthermore, the hypothesis is tested that in negative mood more elaborate evaluative processes guide behavior. In Study 3.2a the implicit attitude towards blood donation was measured, in Study 3.2b the explicit attitude towards blood donation was measured. However, instead of the explicit attitude measure used in Study 3.1 (how positive and negative one feels about the object), we used another explicit attitude measure based on expectancy-value models, a belief-based attitude measure. Explicit attitude measures as we used in Study 3.1 are most likely to be influenced by deliberative processing rather than automatic processes especially when participants have ample time to fill out the questions (e.g., Wilson, et al., 2000), as was the case in Study 3.1. Although the explicit attitude measure of Study 3.1 may be largely influenced by controlled, deliberative processes, we decided to employ an explicit attitude measure that better fits with the deliberative processing adopted in negative mood.

Study 3.2a

Method

Overview

In a preliminary session participants' implicit attitudes towards blood donation were measured. In the experimental session participants watched one of two video fragments to induce either a positive or negative mood. Then they were asked to give their personal information to receive information on becoming a blood donor.

Participants and design

Forty-seven students (37 women and 9 men) of the Radboud University Nijmegen participated in both sessions of this study. Four students did not return for the second session. Only students who had not participated in comparable research before were included. They received 3 euros for their participation. Participants were randomly assigned to either the positive or negative mood condition.

Materials

Participants' implicit attitude towards blood donation was measured by means of an adapted version of the IAT (Greenwald et al., 1998), i.e., the Single Target Implicit Association Test (ST-IAT; Wigboldus, et al., 2006). The ST-IAT allows measurement of the implicit attitude towards one object without the need of using a contrasting category. As there is no natural contrasting category for blood donation, a Single Target IAT was deemed more appropriate than the traditional IAT. In the ST-IAT, consisting of three blocks each including 16 trials, participants had to categorize positive and negative adjectives as well as words concerning blood donation by pressing one of two keys. The ST-IAT started with a practice block in which only the positive and negative adjectives were used. Participants were instructed to indicate as fast as possible whether the word was positive or negative. In the following two blocks the blood donation words were presented as well. In the 'positive' block the positive adjectives and the blood donation words were under the same key, while the negative adjectives were under the other key. In order to equal the number of left and right responses, each negative adjective was presented twice. In the 'negative' block participants had to respond to negative adjectives and blood donation words by pressing one key and the other key had to be pressed when a positive adjective was presented. Each positive adjective was

then presented twice. The order of the second and third block was counterbalanced between subjects. The order of the items within the blocks was randomized. The words used were 4 positive adjectives (*pleasure, fine, fun* and *good*), 4 negative adjectives (*awful, mean, angry* and *bad*) and 4 words concerning blood donation (*blood donation, blood donor, give blood* and *blood bank*). As in the IAT of Study 3.1, error feedback was provided.

When blood donation is evaluated positively and responses are given using the same key as for the positive adjectives, responding will be fast. Similarly, when blood donation is evaluated negatively and responses are given using the same key as for the negative adjectives, responses will also be fast. Conversely, when a person's evaluation of blood donation and the shared response key are evaluatively incongruent, response latencies will be relatively slow. Therefore, response latencies of blood donation words when combined with negative adjectives minus the same response latencies when combined with positive adjectives, constitutes an index of implicit attitude toward blood donation (the higher the score, the more positive the implicit attitude).

Procedure

In the preliminary session the ST-IAT on blood donation was administered. Two weeks later participants returned to the laboratory. First mood was induced by means of two 3-minute film fragments. A fragment of the 'Muppets' was used for the positive mood condition. A fragment of the movie 'American History X' was used for the negative mood condition. As in Study 3.1, participants were asked to especially pay attention to respectively the funny and sad parts.

After this manipulation behavior was measured by having participants fill out a form on blood donation. The behavioral measure of interest in becoming a blood donor consisted of the number of personal details that participants filled out on the form. This form asked for participants' name, address (including street, zip-code and city), telephone number and e-mail address. Participants were instructed that they were free to what extent they filled out this form. The rationale behind the behavioral measure was based on the idea that as participants will be more eager to get information about becoming a blood donor they will be likely to provide more personal details in the form (as the perceived likelihood of receiving information may increase accordingly). Finally, the identical affect questionnaire used in Study 3.1 was administered (α = .94). Afterwards participants were thanked and debriefed.

Results

Mood manipulation check

An ANOVA with mood (positive vs. negative) as independent variable and the mean of the 6 mood items as dependent variable revealed a main effect of mood, $F(1,45) = 5.07$, $p < .05$, $\eta^2 = .10$. In the positive mood condition participants reported feeling more positive ($M = 6.81$, $SD = 1.17$) than those in the negative mood ($M = 5.78$, $SD = 1.88$).

Attitude-behavior link

As in Study 3.1, latencies of the trials on the ST-IAT below 300 ms or above 3000 ms were removed (0.1%). Reaction times of the trials on which a wrong answer was given were also removed (3.0%). The remaining reaction times were log transformed. A ST-IAT score of every participant was calculated by subtracting the reaction times of the block in which blood donation and the positive adjectives were under the same key from the reaction times of the block in which blood donation and the negative adjectives were under the same key. A positive ST-IAT score means then that the participant has a positive implicit attitude towards blood donation. A negative ST-IAT score implies a negative implicit attitude towards blood donation. In the ST-IAT no tendency for a predominantly negative or positive attitude towards blood donation was found, $M = 10$ ms, $t(46) = -.94$, *ns*.

In order to test our hypothesis with regard to the effects of mood on the relation between implicit attitudes and behavior, a regression analysis of the amount of personal information given by the participant and the ST-IAT score was performed. First, the ST-IAT score of each participant was transformed into a standardized score and mood condition was dummy coded (-1 for the negative mood condition and 1 for the positive mood condition). Second, the interaction between the standardized ST-IAT score and mood was calculated. The regression analysis with the ST-IAT score, Mood condition and ST-IAT score x mood as independent variables and the amount of personal information as dependent variable, revealed an effect of the ST-IAT score x mood interaction, $\beta = .39$, $t\ (43) = 2.33$, $p < .05$. No other effects were found (p's > .22). Including block order in the analyses led to no effects.

In Figure 3.2 the interaction between the ST-IAT score and mood is shown. As in Study 3.1 the simple slopes of the positive and negative mood conditions were analyzed. In the negative mood condition ST-IAT scores were unrelated to the amount of personal information that was provided, $\beta = -.19$, $t(43) = -1.14$, *ns*. In the positive mood condition, however, participants who had a negative attitude towards blood donation gave less personal

information than those who were positive towards blood donation, $\beta = .60$, $t(43) = 2.03$, $p < .05$.

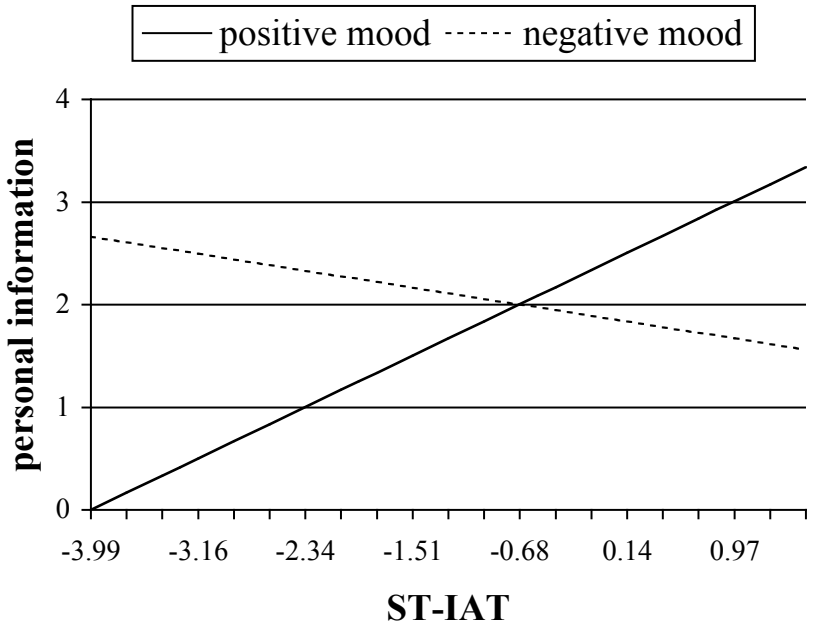

Figure 3.2. Amount of personal information given as a function of the standardized ST-IAT scores for the positive and negative mood conditions. Higher ST-IAT scores mean a more positive implicit attitude towards blood donation, Study 3.2a.

Study 3.2b

Method

Overview

In the first session we measured participants' belief-based attitude towards blood donation. Two weeks later mood was manipulated and behavior was measured.

Participants and design

Fifty-seven students (11 men and 46 women) of the Radboud University Nijmegen participated in both sessions in return for 4 euros. In total seven students did not return for the second session. Only students who did not participate in similar research before were included. Participants were randomly assigned to the positive and negative mood conditions.

Materials

The belief-based attitude towards blood donation was measured in accordance with expectancy-value models of attitudes (Ajzen & Fishbein, 2000; Fishbein, 1963, 1967). In this method the likelihood and evaluation of attributes of an attitude object are indicative for the attitude towards this object. Furthermore, the importance of the attributes is measured as well (Van der Pligt, De Vries, Manstead, & Van Harreveld, 2000). We used 15 attributes of blood donation. These attributes were either positive (e.g., blood donation helps others) or negative (e.g., blood donation hurts). First, the subjective likelihood of each of the attributes (beliefs) was assessed. For each attribute the participant had to indicate how likely this attribute was on a scale ranging from 1 (definitely not) to 7 (definitely). Subsequently the evaluations of the attributes were measured. For each attribute participants had to indicate how positive or negative they evaluated the attribute on a scale ranging from -3 (very negative) to +3 (very positive). Attribute importance was assessed by means of a selection task. Participants were given an overview of all 15 attributes and had to indicate which 5 attributes they personally considered most important. Only the 5 most important attributes of each participant were used to calculate the belief-based attitude as these attributes are a better predictor of ones attitude and behavioral intention than all 15 attributes (Van Harreveld, Van der Pligt, & De Vries, 2000)[5]. The logic behind using only the 5 most important attributes stems from the idea that a relatively small number of important beliefs actually form an attitude (e.g., Fishbein & Ajzen, 1975; Van Harreveld, et al., 2000). As this is the case, these important attributes are more likely to be representative for ones attitude than all 15 attributes and will therefore be a better predictor for behavior.

Within the likelihood and evaluation tasks the order in which the attributes were presented was randomized. The belief-based attitudes were calculated by first multiplying the likelihood score and the evaluation score for each of the attributes. Then, the scores of the 5 most important attributes of each participant were summed. Like in Study 3.2a, the behavioral measure was the extent to which participants filled out a form to receive information on becoming a blood donor.

[5] When the belief-based attitude was based on all 15 attributes similar results were found.

Procedure

In a preliminary session the belief-based attitude towards blood donation was measured. Two weeks later the participants returned to the laboratory. The procedure for this second session was identical to that of Study 3.2a. The only difference was the film fragment used for the negative mood manipulation. This time a fragment of 'Schindler's list' was used.

Results

Mood manipulation check

An ANOVA on the mean of the 6 mood items (α = .92) and mood condition (positive vs. negative) as independent variable revealed an effect of mood, $F(1,55) = 12.21$, $p < .01$, η^2 = .18. In the positive mood condition more positive feelings were reported (M = 6.96, SD = 1.09) than in the negative mood condition (M = 5.68, SD = 1.61).

Attitude-behavior link

To test the hypothesis regarding the influence of mood on the relationship between belief-based attitudes and behavior a regression analysis with the amount of personal information given by the participants and the belief-based attitude was conducted. In the belief-based attitude measure a predominantly positive attitude towards blood donation was found, $M = 10.79$, $t(56) = 14.16$, $p < .001$. The belief-based attitude score (i.e., the sum of the likelihood x evaluation score of the 5 most important attributes for each participant) was transformed into a standardized score and mood condition was dummy coded (-1 for the negative mood condition and 1 for the positive mood condition). Second, the interaction between this standardized belief-based attitude score and mood condition was calculated. The regression analyses with the belief-based attitude score, mood condition and belief-based attitude score x mood as independent variables and the amount of personal information as dependent variable revealed an effect of the belief-based attitude score x mood interaction, β = -.32, t (53) = -2.50, $p < .05$. No other effects were found (p's > .12).

In Figure 3.3 this interaction is presented. Again, the simple slopes of the positive and negative mood conditions were tested. As expected, within the positive mood condition the belief-based attitude towards blood donation was unrelated to amount of personal information given, β = -.13, t (53) = -.73, *ns*. In the negative mood condition, however, individuals with negative belief-based attitudes towards blood donation gave less personal information than those who were positive towards blood donation, β = .53, t (53) = 2.69, $p < .01$.

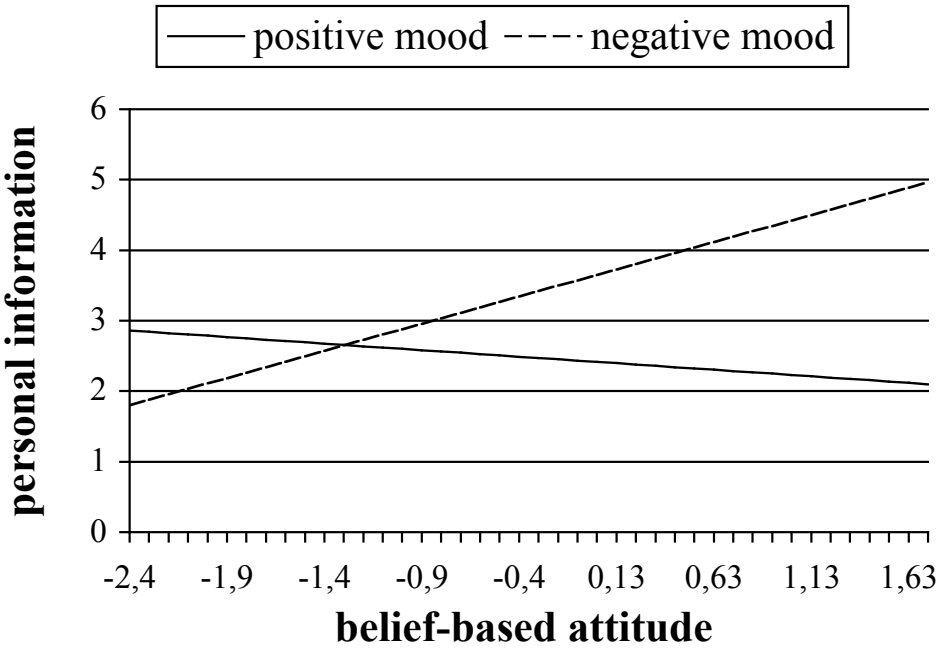

Figure 3.3. Amount of personal information given as a function of the standardized belief-based attitude scores for the positive and negative mood conditions. Higher belief-based attitude scores imply a more positive attitude towards blood donation, Study 3.2b.

Discussion

The results of Study 3.2 support our hypothesis concerning mood and intuitive versus deliberative attitude-behavior processes. Study 3.2a replicated the findings of the Study 3.1, using a different attitude object. Again, as predicted, positive affect evoked a stronger relation between the implicit attitude and behavior than negative affect.

Interestingly, Study 3.2b revealed that mood influences the relation between belief-based attitudes and behavior. The results support our hypothesis that for participants in a negative mood state, belief-based attitudes guide behavior, while belief-based attitudes do not predict behavior for participants in a positive mood state. Study 3.3 was designed to replicate the findings of the previous studies within one full design, and using different attitude objects and behavior processes.

Study 3.3

In this study, we used apples and candy bars as attitude objects following Karpinski and Hilton (2001). In their study on the predictive value of the IAT on behavior, no relation was

found between the implicit preference for an apple or a candy bar and the choice between these two objects. Karpinski and Hilton concluded that the IAT may be contaminated by environmental associations that may be based on cultural processes rather than individual preferences. Going beyond these data, Olson and Fazio (2004b) 'personalized' the IAT such that extra-personal associations were less likely to influence responses. Indeed, in one of their studies, they obtained a relation between the personalized apple-candy IAT and explicit preferences for apples and candies. In this study, we tested whether the personalized IAT would also predict actual decisions for apples and candies. It was hypothesized that for positive mood participants, but not for negative mood participants, the personalized IAT would predict the apple-candy choice behavior. Furthermore, belief-based attitudes were expected to guide this behavioral decision in negative mood states, but not in positive mood states. In contrast to Study 3.2, in this study a full design was employed measuring both the implicit and the belief-based attitude.

This study was also used to further our understanding of the underlying process by which mood influences the attitude-behavior relation as well. It is hypothesized that in negative mood attitudes are based on relative extensive elaboration of information regarding the attitude object, while in positive mood behavior is based on the automatic activation of the attitude. Because deliberative decisions take more time than impulsive decisions, decision latencies will be longer in negative than in positive mood. To test this idea, the time it took participants to choose an apple or a candy bar was measured, as a means to get more insight in the different attitude-behavior processes as a function of mood state[6].

Method

Overview

In a first session half of the participants received one belief-based attitude measure regarding apples and one regarding candy bars. The other half performed a personalized IAT (Olson & Fazio, 2004b) also regarding apples and candy bars. In a second session mood was manipulated and the behavioral measure was the choice for an apple or a candy bar of the participants (Karpinski & Hilton, 2001).

[6] For 44 of 71 participants the time it took to make a decision was measured. During the study it was noticed that participants in negative mood took longer to choose an item than participants in positive mood. After we noticed this, the time it took to make a choice was measured.

Participants and design

Seventy-one students (12 males and 59 females) of the Radboud University Nijmegen participated in both sessions of this study in return for 3 euros. Seven participants did not return for the second session. Again only students who did not participate in similar research before were included. As in the other studies, participants were randomly assigned to either the positive mood or negative mood condition.

Materials

Implicit attitude measure. The implicit attitude towards apples and candy bars was measured with a personalized IAT. This IAT is an adapted version of the traditional IAT (Greenwald et al., 1998) and is presumed to reduce the influence of extra-personal associations on the IAT. The personalized IAT was used in this particular study because research has indicated that this IAT is a better predictor for the choice between an apple or candy bar than the regular IAT (Karpinski & Hilton, 2001; Olson & Fazio, 2004b) The format of the personalized IAT is identical to the original IAT (see Study 3.1). However instead of categorizing clearly positive and negative adjectives on the basis of their valence, participants have to indicate whether they like or dislike certain objects (e.g., *coffee*, *television* and *opera*). Some people evaluate these objects or idiosyncratic items as clearly positive and some as clearly negative. So instead of using the labels 'positive' and 'negative' for the two response keys, the keys are labeled 'I like' and 'I dislike' and participants have to indicate whether they like or dislike the item presented to them. In this way the two keys used for responding are being associated with positive and negative value based on participants' own spontaneous preferences. In this IAT no error feedback was given on the 'I like' and 'I dislike' words. Error feedback was provided, however, on the apple and candy bar words.

Then, when a category is evaluated positively and requires the same response as the items they categorized as 'I like' responding will be fast. Of course the same applies for a category that is evaluated negatively and requires the same response as the 'I dislike' items. However, when the implicit attitude towards the category is positive, but requires the same response as the 'I dislike' items responding will be slow. Again the same applies for a category that is evaluated negatively, but requires the same response as the items that were categorized as 'I like' items. By comparing the responses to the block in which one category (e.g., apple) and liked items were under the same key and the block in which this category

and disliked items were under the same key, one can calculate which of the two categories is preferred.

Belief-based attitude measure. The belief-based attitude measure was, as in Study 3.2b, based on the expectancy-value model (Ajzen & Fishbein, 2000; Fishbein, 1963, 1967). Participants were asked to rate the likelihood, evaluation and importance of 15 attributes concerning apples (e.g., apples are healthy, apples can be sour) and 15 attributes concerning candy bars (e.g., candy bars are delicious, candy bars are unhealthy). As in Study 3.2b likelihood and evaluation were rated on a 7-point scale (1 *definitely not* to 7 *definitely* and -3 *very negative* to +3 *very positive* respectively). The importance of the attributes was measured by asking participants to indicate the 5 most important attributes of each of the objects. Whether the attributes of the apples or of the candy bars were rated first was counterbalanced between subjects.

Behavior measure. The behavior studied (the dependent variable) was the choice between an apple and a candy bar (Karpinski & Hilton, 2001). For that purpose, a table was arranged on which a variety of apples and candy bars were displayed. Specifically, a box (59 cm x 39 cm x 15 cm) divided in 8 segments (2 rows of 4) was filled with 4 types of apples (i.e., Granny Smith, golden delicious, elstar and jona gold) and 4 types of candy bars (i.e., snickers, mars, kit kat and twix). The segments were labeled with the product name. The apples were always displayed next to each other in one row, so were the candy bars. In Figure 4 the display of the apples and candy bars is illustrated. The order in which the candy bars and apples were presented was counterbalanced[7]. We gave participants the choice between several kinds of apples and candy bars, to rule out the possibility that someone for instance dislikes Snickers in particular and therefore would choose an apple while he or she would favor candy bars over apples if a more varied choice were offered.

Procedure

Upon arrival in the laboratory participants were assigned to either the personalized IAT on apples and candy bars or to the belief-based attitude measures concerning these objects. Two or more days later participants returned to the laboratory. First mood was manipulated, again using film fragments. For the positive mood condition a 3-minute fragment of 'Mr. Bean' was used. In the negative mood condition participants watched a 3-minute fragment of 'Schindler's List'. Also participants were again asked to especially pay attention to the funny

[7] The order in which the apples and candy bars were displayed did not affect choice. Also order of blocks in the IAT and belief-based attitude questions had no effects in the analyses.

or sad parts respectively. After watching the video, participants were instructed to report to the experimenter. Then the experimenter guided the participant into the room in which the apples and candy bars were displayed. Upon entering the room the participant was told by the experimenter that he or she could choose something from the box, as a token of our appreciation. To be able to get more insight into the underlying process of mood effects on attitude-behavior relations the time it took participants to make a choice was measured. The moment the participant entered the room the experimenter started the stopwatch. When the participant actually took an item the time was registered. After the participant picked one of the items a mood questionnaire (α = .91) as used in the former studies was filled out. When finished participants were paid and debriefed.

Figure 3.4. The display of apples and candy bars used in Study 3.3 and 3.4.

Results

Mood manipulation check

An ANOVA on the mean of the 6 mood items and mood condition (positive vs. negative) as independent variable revealed an effect of mood, $F(1,69) = 47.33$, $p < .001$, $\eta^2 = .41$. In the positive mood condition more positive and less negative feelings were reported (M = 7.48, SD = 1.02) than in the negative mood condition (M = 5.64, SD = 1.22).

Attitude-behavior link

To test the hypothesis regarding the influence of mood on the relationship between implicit attitudes and behavior and belief-based attitudes and behavior a regression analysis with the

choice between an apple and a candy bar, the implicit attitude and the belief-based attitude was conducted. Because of the dichotomous nature of the dependent behavioral variable logistic regression was employed.

First, implicit attitude scores were calculated. As in Study 3.1 and 3.2a, latencies of the trials on the personalized IAT below 300 ms or above 3000 ms were removed (0.7%). Reaction times of the trials on which a wrong answer was given were also removed (4.7%). The remaining reaction times were log transformed. An IAT score of every participant was calculated by subtracting the reaction times of the block in which candy bars and the 'I like' words were under the same key from the reaction times of the block in which candy bars and the 'I dislike' words were under the same key. Then, a positive IAT score indicates a positive implicit attitude towards candy bars relative to apples and a negative IAT score indicates a positive implicit attitude towards apples relative to candy bars. No tendency for a predominantly positive or negative attitude towards apples or candy bars was found, M = 10 ms, $t(30) = -.51$, *ns*.

Second, for each of the attributes of the belief-based attitude measure of both apples and candy bars the likelihood score and the evaluation score were multiplied, constructing an index for each attribute. Then, the scores of the 5 most important attributes of each participant were summed[8]. This resulted in one belief-based attitude score for apples and one for candy bars. Subsequently, the belief-based attitude score for apples was subtracted from the belief-based attitude score for candy bars, creating an index of the relative attitude towards candy bars as opposed to apples. Thus, a positive score means a more positive belief-based attitude towards candy bars compared to apples, while a negative score means a more positive belief-based attitude towards apples compared to candy bars. A predominantly more positive attitude towards apples (relative to candy bars) was revealed in this comparative attitude measure, $M = -49.00$, $t(39) = -6.27$, $p < .001$. Both the implicit and the belief-based attitude score were then transformed into standardized scores. Including order of block in the IAT or order of the belief-based attitude questions in the analyses did not yield effects.

Subsequently, the interactions between attitude score, attitude measure (implicit vs. belief-based) and mood were calculated. A logistic regression with these interactions, attitude score, mood and kind of attitude measure as independent variables and choice of an apple or candy bar as dichotomous dependent variable revealed an effect of the attitude score x mood

[8] When the belief-based attitude was based on all 15 attributes no effects were found, $B = 1.33$, Wald = 1.78, Exp(B) = 3.76, *ns*.

x attitude measure three way interaction, B = -5.22, Wald = 9.19, Exp(B) = .01, $p < .01$. To further explain the nature of this higher order interaction we separately analyzed the effects of the implicit attitude measure and the belief-based attitude measure as a function of mood. A logistic regression with the implicit attitude revealed an interaction between mood and the attitude score, B = 2.48, Wald = 5.03, Exp(B) = 12.00, $p < .05$. In the negative mood condition the implicit attitude did not predict behavior, B = -.70, Wald = 1.03, Exp(B) = .50, *ns*. When implicitly favoring candy bars the probability of taking a candy bar was not higher than the probability of taking an apple. However, in a positive mood the implicit preference was predictive of behavior, B = 1.78, Wald = 4.24, Exp(B) = 5.95, $p < .05$. An implicit preference for candy bars led to a higher probability of choosing a candy bar than choosing an apple. This interaction is demonstrated in the upper panel of Figure 3.5. No other effects were found, *p's* > .30.

A logistic regression with the belief-based attitude also revealed an interaction between mood and the attitude score, B = -2.73, Wald = 4.31, Exp(B) = .07, $p < .05$. In the lower panel of Figure 3.5 this interaction is displayed. As expected, in the positive mood condition no relation between belief-based attitude and behavior was present, B = -1.36, Wald = 1.47, Exp(B) = .26, *ns*. A positive belief-based attitude toward candy bars did not lead to a higher probability of choosing a candy bar than an apple. On the other hand, negative mood resulted in greater consistency between belief-based attitudes and behavior, B = 1.37, Wald = 3.95, Exp(B) = 3.95, $p < .05$. Positive belief-based attitudes towards candy bars led to a higher probability of choosing a candy bar than an apple. No other effects were found, *p's* > .20.

Time measure

The time it took participants to make a decision was log transformed. To test the hypothesis that in negative mood it takes more time to choose an item is longer than in positive mood an ANOVA with time as dependent measure and mood (positive vs. negative) as independent measure was conducted. The analysis revealed a main effect of mood, $F(1,42) = 5.25$, $p < .05$, $\eta^2 = .11$. In the positive mood condition the choice between an apple and a candy bar was made faster (M = 12.48 sec., SD = 6.96) than in the negative mood condition (M = 16.24 sec., SD = 5.63).

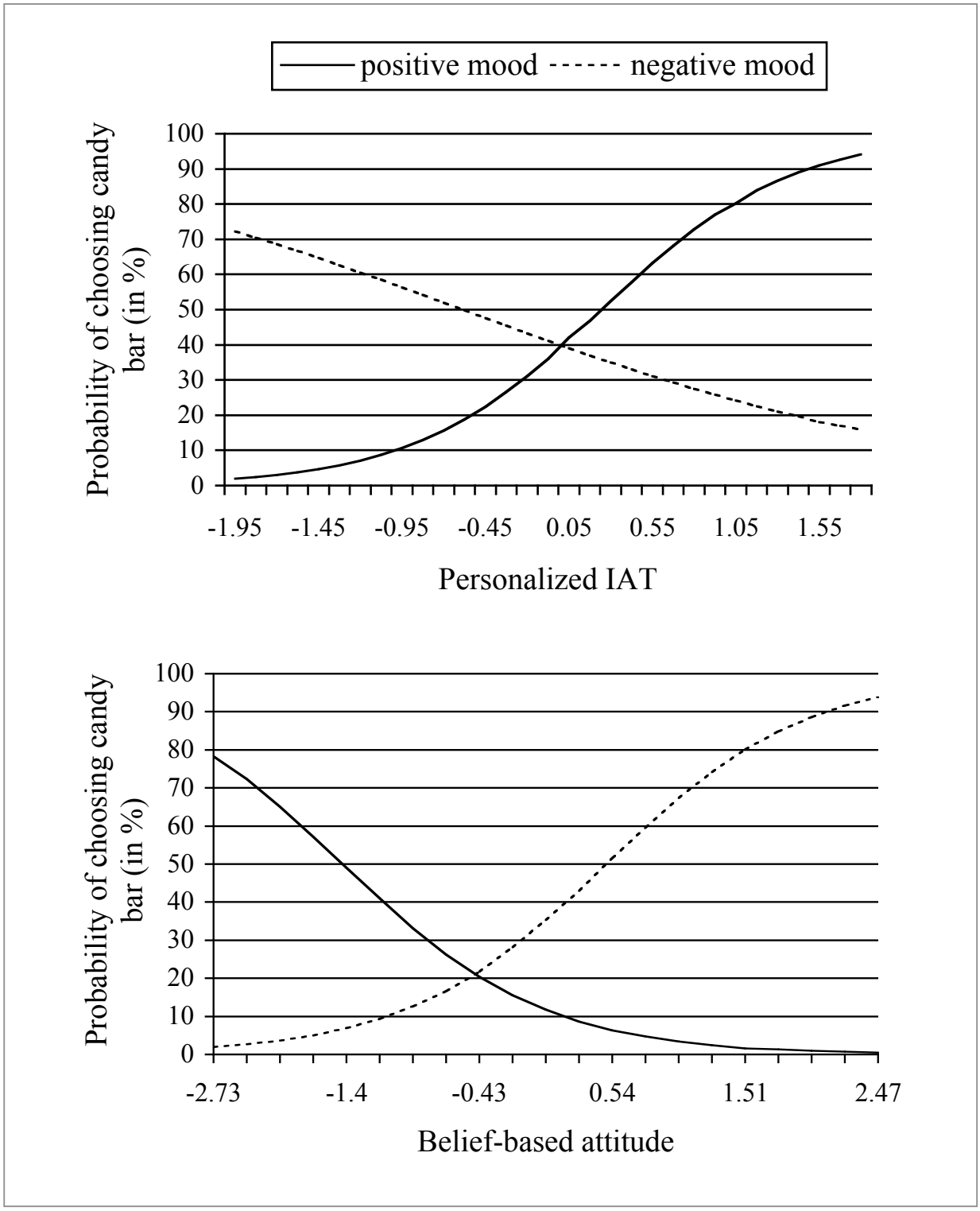

Figure 3.5. Probability of selecting a candy bar or an apple as a function of the standardized implicit attitude scores (upper panel) and the standardized belief-based attitude scores (lower panel) for the positive and negative mood conditions. Higher choice percentages imply a higher probability of selecting a candy bar, lower percentages imply a higher probability of taking an apple. Higher scores on the personalized IAT and on belief-based attitude indicate a positive attitude towards candy bars, lower scores indicate a positive attitude towards apples, Study 3.3.

Discussion

This third study demonstrated again that mood moderates the influence of attitudes on behavior. While implicit measures of attitudes are good predictors of behavior in positive mood states, belief-based attitudes are good predictors of behavior in negative mood states. In this study the results of the previous studies were replicated using apples and candy bars as attitude objects and the choice for one of the objects as behavior. In Studies 2a and 2b we either measured the implicit attitude towards blood donation or the belief-based attitude towards blood donation. In this study both the implicit and the belief-based attitude towards apples and candy bars were measured in one design. Also, this study provided insight in the underlying process of mood influences on attitude-behavior relations. It was found that the choice between an apple and a candy bar took longer in negative mood than in positive mood. Presumably negative mood leads to the consideration of ones beliefs about the attitude object before making a decision, which takes up more time than making a decision on basis of ones implicit attitude in a positive mood.

Study 3.4

In studies 2 and 3, the implicit and belief-based attitudes were measured between subjects. However, the process by which mood affects attitude-behavior relations is an intrapersonal process. Specifically, we assume that when a particular person experiences positive affect, his or her behavior will be predominantly guided by implicit attitudes. Conversely, when the same person experiences negative affect, his or her pertinent beliefs are more likely to guide behavior. The aim of this study was to replicate the findings of the former studies measuring both the implicit and belief-based attitude for each participant. Therefore, in Study 3.4 we used a within-participant design, instead of a between-subject design as in Study 3.2 and 3.3. That is, for each participant we now included both the implicit and belief-based measure. This way, it was also possible to explore the dissociation between belief-based attitudes and implicit attitudes.

The belief-based attitude measure that we have used thus far is quite extensive (30 questions on one attitude object) and may not be suitable to combine in one session with the implicit attitude measure. As a result of the belief-based measure participants are likely to think extensively about information and beliefs they have of the attitude object. This

elaboration might in fact somewhat alter the implicit attitude towards that object. Recent research has shown that changing ones attitude by providing information alters the implicit attitude towards that object (Petty, Tormala, Briñol, Blair, & Jarvis, 2006). In fact, the lengthier explicit measures used in Study 3.2 and 3.3 precluded the use of a within-subjects design. Therefore, for this study we decided to shorten the belief-based measure.

Method

Overview

In a first session participants first received the personalized IAT on apples and candy bars, followed by a belief-based measure on the same objects. Three or more days later mood was manipulated and the choice for an apple or a candy bar was observed.

Participants and design

Eighty-five students (18 males and 67 females) of the Radboud University Nijmegen participated in both sessions of this study in return for 3 euros. Ten participants did not return for the second session. The data of two participants were removed as they did not watch the entire film fragment. Again only students who did not participate in similar research before were included. Participants were randomly assigned to the positive or negative mood condition.

Materials

The personalized IAT used in this study was identical to the personalized IAT used in Study 3.3. The belief-based attitude measure on apples and candy bars was adjusted to make it shorter. From Study 3.3 we derived that certain beliefs were chosen as being one of the 5 most important beliefs more often than others. Based on this information a selection was made of the 5 beliefs concerning apples and 5 beliefs concerning candy bars that were selected as important most often in Study 3.3. As in Study 3.3, participants were asked to rate the probability (on a scale from 1 to 7) and evaluation (on a scale from –3 to 3) of the beliefs. However, now they were only presented with the 5 selected beliefs of each attitude object instead of 15 beliefs of each attitude object. In this way the belief-based attitude measure was reduced from 60 to 20 questions. Because participants were presented with the 5 selected

beliefs of each object no importance ratings were taken. The behavior measure was like in Study 3.3 the choice between an apple and a candy bar.

Procedure

All participants first received the personalized IAT on apples and candy bars. After finishing this IAT the belief-based attitude measure was assessed. Whether the belief-based measure on apples or on candy bars was administered first was counterbalanced. Three or more days later participants returned to the lab. First mood was induced. For the positive mood condition a fragment of The Muppets was used, for the negative mood condition a fragment of 'Schindler's list' was used. Then, participants were asked to make a choice between four kinds of apples and four kinds of candy bars. Finally, the mood questionnaire as used in the former studies was filled out.

Results

Mood manipulation check

An ANOVA on the mean of the 6 mood items (α = .93) and mood condition (positive vs. negative) as independent variable revealed an effect of mood, $F(1,81) = 6.43$, $p < .05$, $\eta^2 = .07$. In the positive mood condition more positive and less negative feelings were reported ($M = 7.08$, $SD = 1.46$) than in the negative mood condition ($M = 6.28$, $SD = 1.41$).

Attitude behavior link

As in the former Studies latencies of the trials on the personalized IAT scoring below 300 ms or above 3000 ms were removed (0.4%). Reaction times of the trials on which a wrong answer was given were also removed (4.6%). The remaining latencies were log transformed. By subtracting the reaction times of the block in which candy bars and the 'I like' words were under the same key from the reaction times of the block in which candy bars and the 'I dislike' words were under the same key an IAT score of every participant was calculated. A positive implicit attitude towards candy bars relative to apples is indicated by a positive IAT score. A negative IAT score indicates a positive implicit attitude towards apples relative to candy bars. No tendency for a predominantly positive or negative attitude towards apples or candy bars was found in this study, $M = 0$ ms, $t(82) = -.21$, *ns*.

The likelihood score of each attribute and the evaluation score of each attribute were multiplied. In this way, for each attribute an index was created. Then, the scores of the attributes were summed. As a result one score for apples and one score for candy bars was created. As in Study 3.3 an index of the relative belief-based attitude towards apples and candy bars was calculated, by subtracting the belief-based attitude score for apples from the belief-based attitude score for candy bars. Then, a positive score means a more positive belief-based attitude towards candy bars compared to apples, a negative score means a more positive belief-based attitude towards apples compared to candy bars. As in Study 3.3 a tendency for a predominantly positive attitude towards apples in comparison to candy bars was found, M = -32.04, $t(82)$ = -8.39, $p < .001$. Both the implicit and the belief-based attitude score were then standardized. The IAT score and the belief-based attitude score did not correlate, $r(83)$ = .15, *ns*.

A logistic regression with mood condition, IAT score, belief-based attitude score, mood x IAT score, mood x belief-based attitude score, IAT score x belief-based attitude score and mood x IAT score x belief-based attitude score was performed on the choice for an apple or a candy bar[9]. First, the analysis revealed that the three-way interaction between mood, IAT score and belief-based attitude score did not reach significance, B = -.07, Wald = .01, Exp(B) = .93, ns. As in Study 3.1 the analysis was rerun without this three-way interaction. This analysis revealed a marginally significant main effect of mood condition, B = .99, Wald = 3.41, Exp(B) = 2.70, $p < .07$. In positive mood a higher probability of taking a candy bar was obtained than in negative mood. An effect of the mood x IAT score interaction was found as well, B = 1.69, Wald = 5.33, Exp(B) = 5.42, $p < .05$. In the negative mood condition the implicit attitude did not predict behavior, B = -.54, Wald = .79, Exp(B) = .58, *ns*. When implicitly favoring candy bars the probability of taking a candy bar was not higher than the probability of taking an apple. However, in a positive mood the implicit preference was predictive of behavior, B = 1.15, Wald = 6.74, Exp(B) = 3.17, $p < .05$. An implicit preference for candy bars led to a higher probability of choosing a candy bar than choosing an apple. In Figure 3.6 top panel this interaction is displayed.

The logistic regression also revealed an effect of the mood x belief-based attitude score interaction, B = -1.72, Wald = 5.44, Exp(B) = .18, p < .05. In the positive mood condition no relation between belief-based attitude and behavior is present, B = -.11, Wald = .07, Exp(B) = .89, ns. A positive belief-based attitude toward candy bars did not lead to a

[9] Including order of block in the IAT, order of the belief-based attitude questions or the order in which the apples and candy bars were displayed in the analyses did not yield any significant effects.

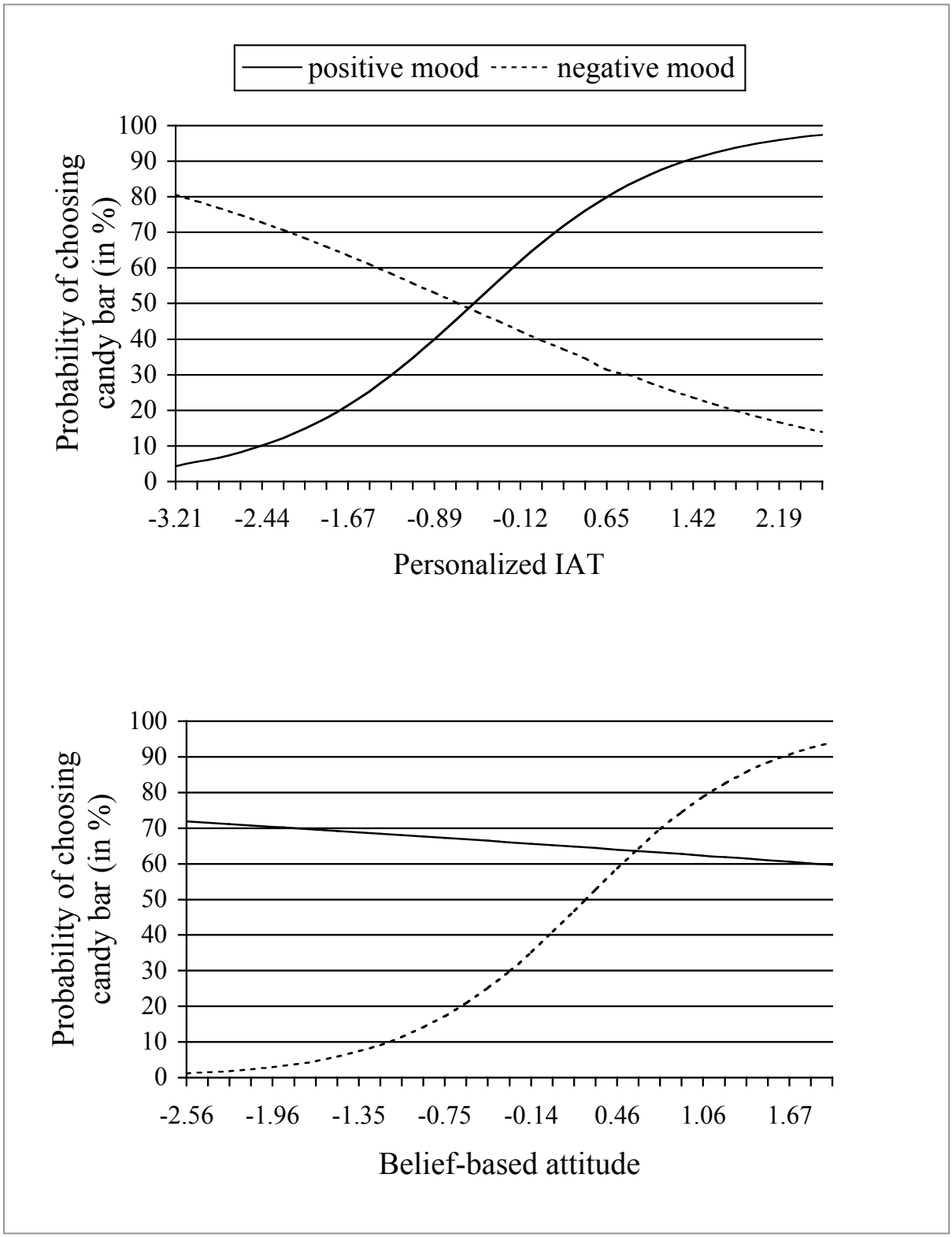

Figure 3.6. Probability of taking a candy bar or an apple as a function of the standardized implicit attitude scores (upper panel) and standardized belief-based attitude scores (lower panel) for the positive and negative mood conditions. Higher choice percentages imply a larger probability of choosing a candy bar, lower percentages imply a larger probability of selecting an apple. Higher scores on the personalized IAT and belief-based attitude measure indicate a positive attitude towards candy bars, lower scores indicate a positive attitude towards apples, Study 3.4.

higher probability of choosing a candy bar than an apple. On the other hand, negative mood resulted in greater consistency between belief-based attitudes and behavior, B = 1.61, Wald = 7.54, Exp(B) = 4.98, $p < .05$. Positive belief-based attitudes towards candy bars led to a higher probability of choosing a candy bar than an apple. This interaction is displayed in Figure 3.6 bottom panel. No other effects were found, $p > .65$.

Discussion

This final study replicated the findings of the former studies using a within-subjects design in which for each participant both the implicit attitude measure and the belief-based attitude measure were administered. Again, it was demonstrated that in positive mood implicit measures of attitudes are good predictors of behavior and explicit measures are not, while in negative mood belief-based attitudes predict behavior and implicit measures do not. Interestingly, the results suggest that the influence of implicit attitudes and belief-based attitudes on behavior are two independent processes as the three-way interaction between the implicit attitude measure, the belief-based attitude measure and mood did not reach significance. This implies then that in positive mood the implicit attitude guides behavior, regardless of the belief-based attitude. Similarly, in negative mood the belief-based attitude predicts behavior independent of the implicit attitude.

General Discussion

The present research is the first to provide evidence for the moderating role mood plays in attitude-behavior processes. Across four studies it was found that implicit measures of attitudes predicted behavior in positive but not in negative mood states, while belief-based measures of attitudes predicted behavior in negative but not in positive mood states. These effects were obtained using different implicit measures of attitudes and various behavioral domains. Study 3.1 revealed that positive mood led to a strong relation between the implicit attitude towards two political parties and approach-avoidance behavior. In negative mood no such relation was found. The explicit attitude measure did not predict behavior in either the negative or positive mood condition. Study 3.2 replicated this finding using a different attitudinal domain, i.e., blood donation and using a different behavioral measure, i.e., the amount of personal information provided to receive information on becoming blood donor.

Using the same behavior paradigm of filling out a form, it was also demonstrated in Study 3.2 that the belief-based attitude predicted behavior in negative mood, but not in positive mood. In study 3.3 both the spontaneous *and* the deliberative attitude behavior processes were examined, using attitudes towards apples and candy bars and observing the choice between these objects as behavior. The results of the other studies were replicated. The implicit attitude predicted behavior in positive mood and the belief-based attitude predicted behavior in negative mood. Also, in negative mood it took longer to make a choice than in positive mood, indicating more elaboration on the choice in negative mood. Finally, in Study 3.4 the implicit and belief-based attitudes towards apples and candy bars were measured within participants. In this within-subject design the results of the previous studies were replicated.

Together, these studies provide evidence that the route by which attitudes influence behavior is dependent on an individual's mood state. In a positive mood state, facilitating the link between automatic evaluation processes and behavior, people are more likely to act on the first evaluation that comes to mind. Conversely, in a negative mood state, which fosters deliberative information processing, people are more likely to act on the basis of explicit, belief-based preferences.

Our hypotheses concerning the impact of implicit attitudinal processes in positive mood states and deliberative attitudinal processes in negative mood states were based on recent models of self-regulation (e.g., Kuhl, 2000; Schwarz, 2002). According to these models, diffuse affective states up- and down-regulate mental systems of information processing. Positive affect signals that the environment is safe and benign. Then, individuals can act on their general knowledge structures and behavioral routines, which serves them generally well. In general, positive mood individuals are more likely to react more intuitively to their environment (e.g., Kuhl, 2000). Therefore, implicit attitudes are better predictors of behavior in positive mood states. Upon perceiving an object, the implicit attitude towards that object is activated automatically and may subsequently guide behavior. Because belief-based attitudes require deliberative, detailed information processing, and positive affect elicits a processing style that is not particularly conducive of such scrutiny of information, belief-based attitudes are less predictive of behavior in positive mood states. This argument is supported by the finding that in positive mood individuals act fast on their decision, suggesting that not much deliberative thought has preceded the behavior.

Negative affect signals that the environment may be problematic or dangerous. As a result, negative mood individuals adopt a cautious and deliberative information processing

style. Because of this cautious, vigilant processing style, reliance on general knowledge structures is abandoned. Within a negative mood state, impulsive responses (e.g., approach) based on implicit attitudes tend to be overruled and, therefore, implicit attitudes are poor predictors of behavior of individuals in a negative mood state. On the other hand, deliberative information processing encompasses the tendency to elaborate and reflect on information. Belief-based attitudes ensue from deliberative processing which comprises scrutinizing beliefs, attributes and consequences of the object (Ajzen, 2001; Ajzen & Fishbein, 1977; Ajzen & Fishbein, 2000; Ajzen & Fishbein, in press). Because negative mood elicits the tendency to elaborate on beliefs concerning an object, behavior is more likely to be guided by such deliberative evaluative processes. As a result, belief-based attitudes are highly predictive of behavior towards the object in negative mood states. The slow decision making in negative mood relative to positive mood is a further indication that indeed in negative mood individuals elaborate on beliefs regarding the attitude object before adopting some course of behavior.

The finding from Study 3.4 that the process by which implicit attitudes guide behavior and the process by which belief-based attitudes predict behavior are independent is in accordance with the theoretical framework outlined above. The independence of the two processes implies that under positive mood the implicit attitude guides behavior regardless of the belief-based attitude, while under negative mood the belief-based attitude predicts behavior independent of one's implicit attitude. We predict that in positive mood a mainly intuitive processing style is adopted, leading to reliance on implicit attitudes, while no or less deliberative processing is taking place. In a positive mood, then, behavior seems less likely to be regulated by the elaboration on the beliefs of the attitude object. As a consequence, in positive mood belief-based measures are unrelated to behavior and also do not affect the link between implicit attitudes and behavior. In negative mood it is believed that responding to the implicit attitude is inhibited and behavior is guided by deliberative information processing (Hermsen et al., 2006a). When the implicit attitude is suppressed it is not likely to influence (i.e., reinforce or weaken) the impact of the belief-based attitude on behavior.

Mood, cognitive capacity and motivation

Besides mood-as-information (e.g., Bless & Schwarz, 1999) two other mood theories have been developed that may provide an alternative explanation for our findings. First, positive and negative mood are thought to have a different impact on the amount of cognitive capacity

it requires (Mackie & Worth, 1989; 1991). More specifically, positive mood should lead to reduced cognitive capacity in comparison to negative mood. A positive mood state is thought to activate other positive material from memory. As a result this positive material will either take up capacity from memory (Isen, Means, Patrick, & Nowicki, 1982) or will function as a distraction (Isen, Daubman, & Nowicki, 1987). Regardless whether the positive material leads to distraction or takes up capacity, positive mood is thought to lead to less processing capacity than negative mood. According to this account, our results could be ascribed to low cognitive capacity in positive mood leading to less elaboration on information and more heuristic processing. In negative mood capacity is not reduced, enabling deliberative processing. However, this alternative explanation would predict a different effect of negative mood in Study 3.1. The observed approach-avoidance behavior from Study 3.1 was unintentional behavior, which required little cognitive capacity from our participants to perform. The capacity account would predict that for both positive and negative mood the implicit attitude predicts this behavior. Unintentional approach-avoidance behavior presumably occurs outside of awareness and deliberative processing is therefore unlikely to overrule any intuitive or implicit seating preference. This implies that there should be no difference between positive and negative mood regarding more automatic processes, as unintentional, automatic processes are not dependent on available cognitive capacity. However, in Study 3.1 we did find a differential impact of positive and negative mood on the attitude-behavior relation. In negative mood the implicit attitude did not predict the behavior, while it did in positive mood. Thus, differences in processing capacity in positive and negative mood cannot explain all our results.

Second, according to the hedonic contingency view (Wegner & Petty, 1994) individuals in a happy mood are motivated to retain this positive state. Positive mood leads to a greater attentiveness to the hedonic outcomes of ones actions than negative mood. When the task and the expected outcome of the task are not threatening for the current positive mood state, people will adopt a more deliberative processing style. However, when the task and the outcomes are threatening no elaboration will take place in order to preserve the positive mood. Thus, an alternative explanation for our findings could be that the behavior measures and the outcomes were threatening to the positive mood states of participants and they therefore refrained from deliberative information processing. Especially for the behavior of Studies 3 and 4 this seems unlikely. One would expect that the unexpected bonus of having a choice between an apple and a candy bar will not be threatening for one's mood

state. Indeed results of a pilot study indicated that both the task and the expected outcome were not threatening to participants' positive mood state[10]. Even though making a choice between an apple and a candy bar was not threatening, positive mood still did not lead to elaborating on the choice. Therefore, our results cannot be explained by the hedonic contingency view, as this theory would have predicted elaboration on the pleasant choice between an apple and a candy bar in positive mood.

Implicit and explicit discrepancy

The idea that mood influences evaluative processing style does not necessarily imply that diffuse affective states always observably moderate the attitude-behavior link. Theoretically, if the evaluation towards an object that is derived from automatic processes is identical to the summary evaluation based on the scrutiny of various behavioral beliefs, both types of processes will instigate the same behavior towards the object, irrespective of someone's mood. Therefore, the attitude objects we employed in the four studies (with the exception of Study 3.1), were chosen such that for many people the automatically activated attitude is likely to be discrepant from the belief-based attitude. For instance, many people will, after some thought, explicitly favor apples over candy bars, because apples are healthier. However, on an implicit level many people might prefer candy bars to apples, because they may find candy bars more tasteful than apples. Conversely, irrespective of their explicit attitudes, many people prefer the fresh bite from an apple above the sweet, sticky taste of a candy bar. Indeed, in line with these observations, in Study 3.4 we found no relation between the implicit attitude measure and the belief-based attitude measure on apples and candy bars. Thus, by using attitude objects with a relatively low implicit/explicit correlation, we were able to demonstrate the moderating role of mood on the attitude-behavior link.

As reported, some of the attitude distributions appeared to be asymmetric. For instance, implicit preference for political parties (socialist vs. conservative) was skewed in favor of the socialist party. Explicit, belief-based attitudes towards blood donation showed a

[10] In the pilot study (n = 15) we asked participants to what extent they would enjoy choosing an item, to what extent they would expect the outcome of the choice to make them feel happy and to what extent the outcome would make them feel sad (all scales: 1 "not at all" to 7 "very much"). First, participants indicated that they would enjoy making the choice, $M = 5.2$, $SD = .77$. This mean significantly differed from the neutral midpoint of the scale, $t(14) = 6.00$, $p < .001$. Furthermore, a positive expectation of the outcome was found. Participants expected to feel more happy ($M = 4.8$, $SD = 1.01$) than sad ($M = 1.8$, $SD = 1.15$) after their choice, $F(1, 14) = 85.91$, $p < .001$, $\eta^2 = .86$.

clear bias in the positive direction, as did explicit measures of belief-based preference for apples relative to candy bars. However, in all pertinent cases (i.e., effects of implicit party preference and effects of belief-based blood donation attitudes under negative mood as well as belief-based preferences for apples over candy bars), the predicted effects were invariably obtained, demonstrating that the measured variance within the asymmetric distribution was nevertheless related to behavior in question in line with predictions.

Matching implicit measures of attitudes with suitable behavior

Some dual process models in social cognition seem to entail that implicit measures of attitudes predict unintentional behavior, while explicit measures of attitudes predict deliberative behavior (Dovidio et al., 2002; Dovidio, et al., 1997; Neumann, et al., 2003; Wilson, et al., 2000). The present studies offer some insight into the extent to which implicit and belief-based attitudes are able to predict various kinds of behavior. The behavioral measure of Study 3.1 (i.e., the seating distance from the posters of the political parties) can be defined as unintentional behavior. Here the implicit attitude influenced behavior, but the explicit attitude (measured by means of asking how positive and how negative one feels about the object) did not. In Studies 3.2a and 3.2b the behavior measured had both unintentional and intentional aspects. Providing personal information is, of course, to some extent subject to a conscious decision to give information or not. However, the amount of information thus provided may as well be influenced by unintentional processes. As the results of the studies indicate, both implicit and belief-based measures of attitudes are capable of influencing this behavior. The choice between an apple and a candy bar, on the other hand, may be defined as intentional behavior. Again it was found that both the implicit attitude measure and the belief-based attitude measure can predict this behavior. Thus it seems that intuitive attitude-behavior processes can affect both unintentional and intentional behavior. Deliberative attitude-behavior processes influence intentional behavior and are less likely to influence unintentional behavior.

The IAT has been criticized for several aspects (e.g., Blanton & Jaccard, 2006; Fiedler & Bluemke, 2006; Olson & Fazio, 2004b; Rothermund & Wentura, 2004). One of the main ‘problems’ concerning the IAT is that it is a relative measure of implicit preference rather than an implicit way to measure absolute attitudes. For example, consider a hypothetical participant in our Study 3.1 who had a positive IAT score, such that the socialist party was more easily associated with positive words than the liberal party. This participant

can be said to have an implicit preference for the socialist party. However, from this IAT score, we cannot tell whether this implies that this person dislikes the liberal party or, for example, whether this person both likes the socialist and the liberal party, but simply likes the socialist party better. This would have been problematic if we had used a behavioral measure that was contingent upon absolute attitudes (e.g. donating money to the socialist party) rather than relative preferences. However, because the behavioral measures of Studies 1, 3 and 4 were sensitive to relative preferences rather than absolute attitudes (choosing an apple over a candy; approaching the poster of the socialist party entails distancing oneself from the poster of the liberal party). In other words our relative behavioral measures matched the 'comparative' IAT scores. The behavior used in Study 3.2 (blood donation), although sensitive to absolute attitudes, again matched the implicit attitude measure, because in that study we employed the Single Target IAT (Wigboldus et al., 2006). Because of the fit between our implicit measures of attitudes and our behavioral measures, we probably attained relatively strong relations between attitudes and behavior. To our knowledge, the present studies constitute the first empirical demonstration that the ST-IAT and the personalized IAT predict behavior. Therefore, the present research also supports the predictive validity of several innovative IAT measures.

Mood and the regulation of behavior

Although the primary contribution of the present research resides in the integration of two fundamentally different processes by which attitudes may translate into behavior, the present work also contributes to a better understanding of the influence of mood on processing styles. Some evidence of mood effects on behavior exists. For instance, it has been found that positive mood leads to more mimicry than negative mood (Van Baaren, Fockenberg, Holland, Janssen, & Van Knippenberg, 2006). Nevertheless, most of the studies within the domain of mood have focused on judgments, persuasion, stereotyping and scripts (see for an overview Bless & Schwarz, 1999; Schwarz, 2002). The present work extends this literature to the regulation of behavior. Actually, by our focus on behavior rather than judgments we have provided a stronger test of the adaptive function of diffuse affective states as safety and danger signals. If a negative affective state signals that the situation is problematic, it may not only be useful to think in an adaptive way, it may be even more useful if this thinking results in adaptive behavioral responses to the situation. Similarly, if a positive affective state signals that the situation is safe and benign, it is not only functional to rely on general knowledge

structures when judging an object, it may be even more functional when this reliance on routines and associations also includes spontaneous behavior based on intuitive preferences.

Conclusions

To conclude, the present results suggest that mood is a moderator of which of two different processes determine attitude-behavior relations. One route by which attitudes may be translated into behavior relations is based on deliberative processes, in which attitudes are the result of elaborating on beliefs, attributes and consequences of the object and thereby affect behavior. In contrast, attitude-behavior relations may also be based on intuitive processing. Attitudes may be activated automatically upon perceiving an object. Such automatic evaluations or implicit attitudes are also likely to guide behavior. While these perspectives are fundamentally divergent, the present studies showed that mood moderates whether the deliberative or intuitive process prevails. Thus, the paradox of one day ponderously deciding to eat healthy and stay away from sweets and the next day happily chewing away a chocolate bar, can be resolved by assuming that different processing systems are at work in different mood states.

Chapter 4

General discussion

The main goal of this dissertation was to get a better understanding of the effect of diffuse affect on automatic attitude processes and behavior regulation. In order to do this we examined the influence of diffuse affect on the automatic evaluation effect and the attitude-behavior link. In this final chapter I will review the findings of empirical chapters 2 and 3 and discuss implications of these findings for the attitude domain and mood research.

Automatic caution

One of the goals of the present research was to get more insight in the effect of diffuse affect on automatic information processing. In Chapter 2 we focused on this issue. Specifically, the influence of diffuse affect on the automatic activation of attitudes was examined. In several studies it was found that negative diffuse affect elicits a decreased automatic evaluation effect in comparison to positive diffuse affect. In one of the paradigms an attitude object (e.g., flower) was presented directly followed by an adjective (e.g., good). Participants were asked to quickly indicate if the adjective was positive or negative. In general, responding is fast when the valence of the object and the adjective are similar (e.g., flower and good) and responding is slowed down when the object and the adjective are opposite in valence. In the first study positive and negative mood was measured and regressed on the automatic evaluation effect. It was found that when negative mood increased, the automatic evaluation effect decreased. No effects of positive mood were found though. In Study 2.2 mood was manipulated instead of measured. Again it was found that the automatic evaluation effect (measured by means of an EAST) decreased in negative mood in comparison to positive mood. In the final study we used a slightly different paradigm. Instead of measuring or manipulating mood, we exposed participants to happy or sad facial expressions. In general it

is assumed that happy faces elicit an intuitive processing style (like positive mood), while sad faces lead to deliberative processing (like negative mood). Before participants started with the automatic evaluation paradigm, either pictures of happy faces or pictures of sad faces were subliminally presented. Consistent with studies 2.1 and 2.2, when exposed to happy faces the automatic evaluation effect was apparent. However, when primed with sad faces the automatic evaluation effect had disappeared. Thus, these studies have shown that mood (or exposure to facial expression) influences the automatic evaluation effect.

In studies 2.1 and 2.2 the decreased automatic evaluation effect seemed due to slower responding to consistency in negative mood (or when negative affect increased) in comparison to positive mood (or when negative affect decreased). In Study 2.3 we found more evidence for this effect. By including trials with a letter string (e.g., bbbb) as prime a neutral baseline was created. The results showed that participants primed with happy faces responded faster to consistency than to inconsistency with the neutral baseline falling in between. However, when primed with sad faces responding to consistency was slower than responding to the neutral baseline. Thus, the decreased automatic evaluation effect in negative mood (or when exposed to sad faces) is due to slower responding to consistent stimulus pairs.

The results of Chapter 2 support the hypothesis that diffuse positive and negative affect have a differential impact on the automatic evaluation effect. More specifically, the decreased automatic evaluation effect in negative mood is due to slower responding to consistency in comparison to positive mood. Thus, negative mood elicits a tendency to suppress responding to automatically activated attitudes. Also the results are mostly due to increased levels of negative affect, rather than differences in positive affect (see Cacioppo, Gardner, & Berntson, 1997 for independence of positive and negative affect). For instance, in Study 2.1 variation in negative affect, and not positive affect, influenced the automatic evaluation effect. Consequently, these results are best explained by cautious processing in negative mood. Negative mood signals that the current situation is problematic (Schwarz, 2002). In this case it is most adaptive to abandon reliance on automatic processing, because this style of processing most likely will not lead to solving the problem and will be likely to lead to greater costs when making errors. As direct responding to automatically activated attitudes is error prone, the first response to this attitude is suppressed.

Cues that signal that the situation is benign, like positive mood, will elicit an intuitive processing style. When everything is going smoothly, it is not necessary to process

information in a deliberative way. Relying on associative and automatic processes will suffice to respond adequately to the environment. In Chapter 2 it was found that in positive mood the "standard" automatic evaluation effect is present, indicating that individuals respond quickly to automatically activated attitudes.

In the present studies results seem mainly due to negative mood or variations in negative mood. Cautious processing seems a function of negative mood, rather then a function of positive mood. Although not discussed earlier, we do not rule out the possibility that positive mood can have a differential influence on the automatic evaluation effect as well. As outlined in the introduction positive mood is assumed to elicit intuitive processing. Intuitive processing encompasses associative processing. This increase in associative processing in positive mood might influence the automatic evaluation effect. Positive mood then would mainly influence responding to inconsistent stimulus pairs. As positive mood individuals rely more on their associations, inconsistency between two stimuli would be experienced to a greater extent. As a result, responding to inconsistent stimulus pairs would slow down[11]. Thus, although the effects of the studies of chapter 2 are due to negative diffuse affect, increased positive mood might still have a differential effect on the automatic evaluation effect. It is important to note though, that we have no clear indication that the effects found in chapter 3 on the attitude-behavior link are mostly due to negative mood. Here both variations in positive *and* negative mood may have contributed to the obtained effects.

In Study 2.3 we used exposure to happy and sad faces instead of diffuse affect to manipulate information processing. Exposure to facial expressions has been found to elicit mood like effects on information processing. For instance, exposure to frowning faces leads to increased elaboration in comparison to exposure to happy faces (Soldat & Sinclair, 2001). In the present research, we found that, consistent with the induction of positive mood, the exposure to happy faces led to the "standard" automatic evaluation effect. Exposure to sad faces, on the other hand, led to a decreased automatic evaluation effect, consistent with the effects obtained in negative mood conditions. Although exposure to faces leads to similar effects as the manipulation of mood, presenting individuals with happy or sad faces does not elicit an explicit negative or positive mood (Soldat & Sinclair, 2001; Winkielman, Berridge, & Wilbarger, 2005), which is consistent with our own findings (i.e., no effects were found on

[11] In one study in which we measured affect and administered an IAT, we found that increased positive affect led to an increased automatic evaluation effect. Specifically, increased positive affect led to slower responding to inconsistent items. Because we were not able to replicate this effect, this study was not reported.

a mood questionnaire). Rather, happy and sad faces are thought to act as signals about the state of the environment like mood, but without directly affecting mood.

Attitude-behavior link

In Chapter 3 we focused on mood and behavior regulation. In four studies the relation between implicit attitudes and behavior and/or the relation between belief-based attitudes and behavior as a function of mood was examined. These studies consisted of a pre-measure of the implicit and/or the belief-based attitude towards a wide range of attitude objects (i.e., political parties in Study 3.1, blood donation in Study 3.2 or apples and candy bars in Study 3.3 and 3.4). In a second session, several days after the first session, mood was manipulated and behavior towards the object observed (i.e., seating proximity to posters of political parties in Study 3.1, filling out a form on becoming blood donor in Study 3.2 and choosing between an apple and a candy bar in Study 3.3 and 3.4). The results of these studies consistently showed that mood moderates the relation between implicit attitudes and behavior and belief-based attitudes and behavior. Specifically, in positive mood the relation between implicit attitudes and behavior was very strong, while the belief-based attitudes did not predict behavior. On the other hand, in negative mood belief-based attitudes predicted behavior very strongly, while no relation between implicit attitudes and behavior was found.

These results support our hypothesis about mood as moderator of attitude-behavior relations. Positive mood signals that the situation is benign, which leads to intuitive processing. As a result individuals in positive mood rely on implicit attitudes, resulting in a strong relation between implicit attitudes and behavior. On the other hand, intuitive processing is not conducive of analytical processing. Therefore knowledge or beliefs about an attitude object are not considered, resulting in a weak relation between beliefs and behavior.

Negative diffuse affect is linked with problematic situations. Therefore it is not adaptive to adopt an intuitive information processing style. Intuitive processing is thus abandoned and a deliberative, cautious information processing style is adopted. This processing style entails elaboration of information and avoiding errors (Fiedler, 2001). Quick responding to automatically activated attitudes is error prone. Therefore, immediate responses to automatically activated attitudes are suppressed. Thus reliance on automatic evaluations or implicit attitudes is abandoned. As a consequence behavior towards the object is then not guided by these implicit attitudes either. Especially in study 3.1, in which we measured the

implicit attitude towards two political parties and subsequently measured seating proximity to posters of the two parties, the automatic caution effect in behavior regulation becomes apparent. The behavior measured here, i.e., seating proximity, is unintentional. Previous studies have shown implicit attitudes may be closely related to unintentional behaviors. In contrast, explicit attitudes are generally not related to this type of behavior (e.g., Asendorpf, Banse, & Mücke, 2002; Dovidio, Kawakami, & Gaertner, 2002). Therefore, the absence of a link between the implicit attitude and behavior can be ascribed to suppressing responses to the implicit attitude in negative mood.

Negative mood does lead to elaboration of knowledge. In this case it leads to the elaboration of beliefs about an attitude object. Then, in negative mood the belief-based attitude is reflected on when giving an attitude judgment (Hermsen, Holland, & van Knippenberg, 2004). Subsequently, the belief-based attitude guides behavior towards the attitude object. The finding in Study 3.3 that negative mood individuals take longer to make a decision than positive mood individuals is consistent with this assumption. It will take more time to consider several important beliefs before making a choice, than relying on implicit attitudes. Finally, the independence of the two attitude-behavior processes found in Study 3.4 further supports our theoretical assumptions described above. It was found that the deliberative attitude process and the implicit attitude process are independent. In positive mood the implicit attitude predicts behavior, regardless of one's belief-based attitude. Similarly, in negative mood the belief-based attitude guides behavior, regardless of one's implicit attitude. This indicates that in positive mood indeed beliefs are not considered when acting towards an object, presumably because positive mood does not elicit a tendency to elaborate on knowledge. Similarly, in negative mood only beliefs are considered and implicit attitudes are not relied on. Thus, the results of Chapter 3 provide strong evidence that diffuse affect influences behavior regulation. In general, positive mood leads to intuitive behavior regulation, while negative mood leads to deliberative regulation of behavior.

Diffuse negative affect and inhibition

The present research indicates that negative mood elicits a tendency to suppress responses and behavior that result from intuitive processing. Although no direct evidence is provided, the current research does suggest an inhibition mechanism in negative mood. Therefore, I would like to speculate on such a process elicited by negative affect. This process would

entail the direct inhibition of impulsive responses to the environment in negative mood, as these quick reactions are not adaptive in problematic situations. Thus, for instance, when in a negative mood the tendency to grab the candy bar in front of you elicited by intuitive processing is immediately inhibited. Not only conscious behavior, but also unconscious reactions might be inhibited by this system. Consider for instance Study 3.1 in which we measured unintentional approach-avoidance behavior (i.e., seating proximity to posters). In this study we found that this behavior was not predicted by the implicit attitude in negative mood. One might infer that the unintentional behavior elicited by intuitive processing was stopped or suppressed in negative mood. Contrary to intentional or conscious behavior though, deliberative processing will not guide this behavior either. Due to the unintentional nature of the action, deliberative processing cannot guide this behavior (e.g., Asendorpf et al., 2002; Dovidio et. al, 2002).

Next to the present studies, some indirect support for an inhibition mechanism can be found in the literature as well. First, it has been suggested that in the context of negative stimuli a 'freeze' response is elicited, i.e. the speed of motor behavior is inhibited (Wilkowski & Robinson, 2005). Several studies have also shown that responding by individuals who are depressed or are in a negative mood state is slowed down (e.g., Fossati, Ergis, & Allilaire, 2002; Velten, 1968; see also Study 3.3). For instance, in a depressed mood state individuals' writing speed is slowed down and they take more time to make decisions (e.g., Velten, 1968). Also depressed individuals have been found to respond slower than non-depressed individuals (Cataldoa, Nobilea, Lorussoa, Battagliab, & Moltenia, 2005; Fossati, et al., 2002). These results of slow responding in negative mood and with depressed individuals are in line with the assumption of an inhibition mechanism.

On a theoretical level negative affect might also be related to the Behavioral Inhibition System (BIS; Gray, 1972, 1981). This system is thought to inhibit behavior that may lead to negative outcomes (i.e., inhibition of movement towards goals) and is sensitive to signals of punishment and novelty. Thus this system might respond to cues that signal that something is wrong in the situation. Hypothetically, negative diffuse affect, which signals that the situation is problematic, may lead to increased activation of the BIS. Although this relation has not been established, negative affect is assumed to be associated with the BIS. That is, the process of behavioral inhibition is assumed to be responsible for the experience of negative affect.

Some research and theory thus seem to hint at an inhibition mechanism. This

mechanism is thought to mainly be a function of negative affect. To be specific, increased negative affect will lead to increased inhibition of impulsive responses; decreased negative affect will elicit decreased inhibition. This impact of negative affect is assumed to be independent of effects of positive affect. In other words decreased positive affect will not necessarily lead to more inhibition. In line with this, positive and negative affect have been defined as independent (Cacioppo et al., 1997). Therefore, the effects of positive and negative affect can be differential as well. As some of the present studies allow for speculation on negative affect but not on positive affect, I will refrain from making assumptions about the impact of positive affect.

I have speculated on an inhibition mechanism associated with negative mood. Although we cannot present direct evidence for such a mechanism, indirect hints are present in the current research and that of others. Needless to say more direct evidence should be obtained. Nevertheless, considering such a process can be of interest for theorizing and future research on mood effects.

Three theories on mood

As outlined in the introduction several theories can account for mood effects on information processing. First, it has been suggested that mood influences cognitive capacity (Mackie & Worth, 1989; 1991). Positive mood should take up more capacity than negative mood leading to heuristic processing in positive mood. Secondly, positive mood has been hypothesized to lead to motivation to remain in this state, therefore refraining from elaboration on tasks that might be threatening to the mood state (Wegner & Petty, 1994). Third, mood has been suggested to inform the individual about the state of the environment leading to an information processing style tuned to the situation (Schwarz, 2002). The capacity and motivation account cannot fully explain the present results on the influence of mood on automatic processing and behavior regulation. First, the automatic evaluation paradigms used in Chapter 2 are thought to measure automatic processing. Automatic processing requires little cognitive capacity. Then, according to the cognitive capacity account there should be no difference between positive and negative mood regarding automatic processes. However, in chapter 2 we did find effects of mood on the automatic evaluation effect. In line with this, in Study 3.1 we observed unintentional approach-avoidance behavior, which required little cognitive capacity from our participants to perform. The capacity account would thus predict

that for both positive and negative mood the implicit attitude predicts this behavior. However, we found that in negative mood the relation between implicit attitude and behavior was very weak, while in positive mood this relation was strong. Thus, the cognitive capacity account cannot fully explain our results.

Second, the hedonic contingency view cannot sufficiently explain our results either. In study 2.3, we subliminally presented participants with happy or sad faces leading to results consistent with the studies in which mood was measured or manipulated. This manipulation with facial expressions did not lead to respectively a positive or negative mood state. As in this study mood was not manipulated, the motivation to remain in a positive mood state cannot account for the results of this study. Furthermore, the hedonic contingency view predicts that individuals are motivated to remain in a positive mood. Therefore, when a task and/or the outcome of the task are threatening to positive mood, individuals will refrain from deliberative processing in order to remain in this state. The behaviors measured in chapter 3 do not seem threatening, especially the unexpected choice between an apple and a candy bar. Indeed, a pilot study showed that this task formed no threat (see also general discussion chapter 3). Thus even tough the behavior posed no threat to the positive mood state, still no elaboration on the choice between an apple and a candy bar was found. It seems then that the hedonic contingency view cannot explain all our results either.

The cognitive tuning account, however, explains our results best. This theory allows for mood effects on automatic processing (while cognitive capacity does not) and is not restrained to certain task demands like the hedonic contingency view. Furthermore, cognitive tuning not only offers predictions for mood. It can also explain our results on facial expressions, as this fits in the general framework of cognitive tuning.

Mood and the MODE model

Next to mood research, the present dissertation has implications for the attitude literature as well. Little is known about the conditions in which automatic or deliberative attitude processes are most likely to occur. The present research offers some more insight in this matter by identifying a moderator, namely mood, for these attitude processes. The moderating role mood plays with regard to cognitive processing style provides a theoretical framework to reconcile two different processes underlying attitude-behavior consistencies. In this regard, the pattern of our results shows correspondence with the MODE model (Fazio,

1990; Fazio & Towles-Schwen, 1999), which delineates the circumstances for deliberative and spontaneous processing to occur. This model suggests that motivation and opportunity are key factors in determining the route by which attitudes may be translated into behavior. According to the MODE model, attitude-behavior relations are only based on deliberative processing when the motivation *and* the opportunity to elaborate are present. Thus, when both motivation and opportunity exist, belief-based attitudes are expected to affect behavior. However, when there is either no motivation or no opportunity to deliberate, behavior will be influenced by spontaneous attitudes as these attitudes are to a larger extent based on automatic processing.

Like the factors included in the MODE model, the present data suggest that mood influences attitude-behavior processes. To what extent do our mood effects fit in with the variables that are part of the MODE model? One possibility is that mood may influence the opportunity to deliberate. This seems unlikely. Although it has been argued that positive mood states may hamper information processing capacity (Mackie & Worth, 1989; 1991), these ideas have been refuted by the finding that people in a good mood are able to engage in systematic processing when required to do so (Bless, Clore, Schwarz, Golisano, Rabe, & Wolk, 1996; Ruder & Bless, 2003; Schwarz & Clore, 1996). In addition, our present data do not seem to converge with capacity as moderation of mood effects (see 'three mood theories' in this chapter).

Alternatively, can mood effects be subsumed under motivation? The MODE model assumes that 'some motivational force is necessary to induce individuals to engage in the reasoning' (Fazio & Towles-Schwen, 1999, p. 100). Although mood may be classified under the very general term 'some motivational force', the nature of the motivation that is derived from negative mood states, is quite different from the types of motivation that have been used in studies on the MODE-model. For instance, two sources of motivation for deliberative thought that have been studied were manipulations regarding fear of invalidity (Sanbonmatsu & Fazio, 1990), and individual differences in the motivation to avoid to be prejudiced towards African Americans (Fazio, Jackson, Dunton, & Williams, 1995). In studies like these, participants are likely to be aware that they need to process information in order to protect themselves against incurring potential costs. The possible relationship between mood and motivation is of different nature. In line with others, we argue that mood has a signal function concerning the current state of the environment (e.g., Bless & Schwarz, 1999; Kuhl & Koole, 2004). Negative mood signals that the environment might pose a problem that

needs to be handled. In such instances, it is functional to mobilize energy such that we may get a better understanding of our situation and we may be better able to solve the problem. However, awareness of this need for detailed processing as a result of negative mood seems unnecessary and even unlikely. More likely, the processing style is automatically tuned to the needs of the situation (cf., Kuhl & Koole, 2004). Only if we use the term motivation in a broad sense, i.e., including the (survival related) necessity to respond adequately to potential threats or benefits in the environment, can the present mood effects be subsumed under the factor motivation in the MODE model. In sum, only when taking a broad perspective regarding sources of motivation within the MODE model, our present results can be explained within the model.

Actually, as a special case of testing the MODE model, the present research makes an important contribution to the theory. Thus far, empirical evidence for the MODE model was predominantly obtained by testing the relation between automatically activated attitudes and explicit attitudinal responses. For example, automatically activated attitudes towards blacks were found to be correlated with explicit evaluations of blacks, but only for those individuals with a low motivation to control their prejudice. This correlation was attenuated (and even slightly reversed) for individuals with a strong motivation not to be prejudiced (see Fazio et al., 1995). Although these studies provide compelling evidence for the MODE model, these data concern explicit attitudes and not actual behavior. Given the fact that the model is primarily concerned with attitude-*behavior* processes, our studies with actual behavioral measures can be considered as going beyond these data.

Thus, by defining diffuse affect as moderator for attitude-behavior relations, the present research reveals an important and fundamental piece of knowledge. We show that information processing style is a key factor to what extent implicit or belief-based attitudes are used. By manipulating mood an intuitive or deliberative, cautious information processing style is adopted (e.g., Kuhl, 2000; Smith & DeCoster, 2000). Intuitive processing elicits reliance on automatically activated attitudes, which translates into behavior. Deliberative processing leads to abandoning reliance on automatic evaluations, but an increased tendency to elaborate on beliefs, which subsequently guides behavior. The present work offers an important moderator for implicit and deliberative attitude processes.

The future

Automatic versus controlled attitude processes

Although the present work contributes to our knowledge of mood effects on automatic attitude processes and offers a moderator for attitude-behavior processes, more research in this field needs to be done. As yet only a few moderators of intuitive and deliberative attitude processes have been identified (Asendorpf, et al., 2002; Dovidio, et al., 2002; Fazio, 1990). Therefore our knowledge on the dominance of intuitive or deliberative attitude processes is limited. Of course it is of great importance to understand under which conditions implicit attitudes are relied on and when people tend to consider their beliefs. Furthermore, in the present work the emphasis has been on moderation of the two processes. However, it is also of interest to study the interplay between implicit and belief-based attitudes. It is likely that automatic and deliberative attitude processes interact and influence each other under certain circumstances. For instance, automatically activated attitudes might influence processing of knowledge about an attitude object. Although this idea on the interaction between the two processes has already been posited some years ago (e.g., Fazio & Towles-Schwen, 1999) at the present still not much is known about this interaction. Therefore future research should focus on this question.

Automatic caution outside the attitude domain

Considering the present findings, mood research that mainly focused on the domain of explicit judgments can be seen in a new light. Mood effects have mainly been found on judgments that could be influenced by both automatic and deliberative processes (Fazio & Towles-Schwen, 1999; Payne, 2001). Therefore, these effects might be partly due to mood influences on automatic processing. For instance, research on stereotypes has consistently shown that positive diffuse affect leads to an increased use of stereotypes in comparison to negative diffuse affect (e.g., Bless, Schwarz, & Wieland, 1996; Bodenhausen, Kramer, & Süsser, 1994). Part of these results might be explained by the suppression of automatically activated stereotypes in negative mood. Therefore, it would be interesting to study the effects of positive and negative mood on automatic processing in other domains, as for instance on the use of stereotypes.

Automatic accuracy

The automatic caution effect has been defined as refraining from quickly responding to automatically activated information, presumably because this is error prone. Automatic caution gave rise to slower responding to automatically activated attitudes. Another aspect, which we believe is inherent to automatic caution, is accuracy in responding. As automatic caution is due to avoidance of errors, responding should not only be slowed down, it should become more accurate as well. Due to the nature of the automatic evaluation paradigms used in the present studies, i.e., overall high accuracy in responding, it was not possible to find this effect in the current data. Also our main goal of these studies was to establish that responses to automatically activated attitudes are suppressed in negative mood, which is most apparent in reaction times. Therefore, future research should be concerned with the impact of diffuse affect on accuracy in automatic evaluation or other paradigms.

Detailed processing

According to cognitive tuning, processing in negative mood will become more detailed in comparison to positive mood. Negative diffuse affect is thought to lead to focusing on details in the situation (Schwarz, 2002). The focus on details would already be highly adaptive in an early stage of information processing. When receiving a signal that something is wrong it is important to scan the environment and form a detailed visual representation of the situation to be able to potentially identify the problem and to subsequently process information. It can be expected then that early visual perception and processing is influenced by diffuse affect, i.e., in negative mood visual perception is more detailed than in positive mood. Even though it has been found that negative mood leads to more detailed processing than positive mood (Gasper & Clore, 2002), this research has not specifically focused on early visual perception.

To wrap up

Traditionally mood influences on information processing have been studied in the domain of explicit judgments. Although this research has enhanced our knowledge of mood effects, differential effects of positive and negative mood on automatic processing and behavior regulation could not be established. First, we have shown in several studies that mood influences automatic processing. Negative diffuse affect induces cautious processing and therefore the tendency to suppress responding to automatically activated attitudes. In positive

mood, on the other hand, reliance on automatic processes is maintained. Second, because of different information processing, behavior is affected differently in positive and negative mood. Negative diffuse affect elicits deliberative attitude processes, while positive mood leads to intuitive attitude-behavior processes. By examining the effect of diffuse affect on automatic processing and behavior regulation we feel we have contributed to the understanding of information processing and behavior in positive and negative mood.

Finally I would like to go back to Manny and Sid from the movie “Ice Age”, who featured in the opening lines of this dissertation. It seems that the sad Manny has a strong tendency to suppress quick responses, to think over situations and refrain from impulsive behavior. The happy Sid, however, lacks the suppression of responses. As a result Sid acts impulsive in the situations he encounters. Of course Manny and Sid are exaggerated cartoon characters, who either have strong inhibitions or none at all. Thankfully for us humans, we are capable of both!

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Summary

Diffuse positive and negative affect (or mood) influences information processing. Unlike specific emotions diffuse affect is not attributed to a specific source, therefore not directly influencing behavior towards a source. In general positive mood elicits intuitive processing, while negative mood leads to deliberative processing. A wide range of behaviors in our everyday lives can be influenced by the information processing style we adopt. Consider for instance purchasing a video game. When walking by the stand you can either elaborate on features of several games or decide on the basis of a friend's enthusiasm about a game. Mood can influence this decision process. Negative mood will lead to elaborating on information about the game, while positive mood will lead you to rely on your friend's preference. The choice made on elaborating on features is mainly a controlled process, with little automatic processing. Relying on your friend, however, is already more of an automatic process and less of a controlled process. Human behavior, however, can be mostly automatic as well though. When buying a game you may just as well walk past the stand on your way to the counter and grab one impulsively. What influence could mood have on this process? Strikingly, very little attention has been given to automatic processes and subsequent behavior in relation to mood influences on information processing. Therefore, the potential differential effect of positive and negative diffuse affect on this form of processing is largely unknown. The goal of the present dissertation was to extent our knowledge of the impact of diffuse affect on automatic processing. Specifically, we have examined the influence of positive and negative diffuse affect on automatic attitude processes and behavior regulation.

Diffuse affect

Positive mood leads to intuitive processing, while negative affect elicits deliberative processing. Intuitive processing entails associative processing. Elements are linked through simple associations. The activation of one element can than spread to other elements. Processing is fast and holistic. Deliberative processing, on the other hand, entails serial and analytical processing. Knowledge and consequences are considered when making decisions and behaving. One theory on why mood has this effect on information processing assumes that mood informs people about the state of the environment. Positive affect signals that the

situation is benign, therefore intuitive processing is sufficient. Negative mood, however, informs the individual there is a problem. In this situation it is more adaptive to adopt a deliberative processing style.

Indeed research on mood effects has generally shown that positive mood leads to intuitive processing, while negative affect elicits deliberative processing. This research has, however, mainly focused on explicit judgments. As a result the impact of mood on automatic processes and behavior regulation is largely unknown. We have focused on this matter and examined mood effects on automatic processing and behavior regulation in the attitude domain.

Attitudes

An attitude is the tendency to evaluate a particular entity (e.g., an object, a person, an institution etc) with some degree of favor or disfavor. It has become evident that attitudes can be the outcome of both automatic and deliberative processing. First, when perceiving an object in the environment the associated attitude can be activated automatically. Automatically activated attitudes (or implicit attitudes) may subsequently influence behavior. Attitude processes can be more deliberative as well. Attitudes formed through deliberative processing are generally thought to have beliefs as their main source. These attitudes are based on the expectancy and the evaluation of behavioral outcomes of the object as suggested by expectancy-value models. These belief-based attitudes are assumed to influence intention and behavior, although results concerning the influence of beliefs on behavior are mixed.

Present dissertation

Attitude processes can thus be both automatic and deliberative. Then the question arises when do people rely on automatically activated attitudes and when do people elaborate on beliefs. The present dissertation focused on the influence of mood on the automatic activation of attitudes and on the relation between implicit attitudes and behavior and belief-based attitudes and behavior.

Automatic evaluation effect

In Chapter 2 we examined the influence of mood on automatic attitude activation. The automatic activation of attitudes is usually measured in a reaction time paradigm. Generally

the presentation of an attitude object (e.g. spider) facilitates responding to an evaluative congruent stimulus (e.g., bad), which is presented immediately after the object. When the attitude object is followed by an evaluative incongruent stimulus (e.g., good) responding is slowed down. In theoretical terms, when the attitude object 'spider' is perceived the negative attitude is activated, therefore making it easier to respond to stimuli that are congruent, and harder to respond to stimuli that are incongruent. In all studies we measured this automatic evaluation effect using this paradigm or a related one (i.e., the EAST). In the first two studies mood was either measured or manipulated. The results of these two studies showed that in positive mood or absence of negative mood the automatic evaluation effect was present, i.e. fast responses to consistent stimulus pairs and slow responding to inconsistent stimulus pairs. However, in negative mood or absence of positive mood this effect was not obtained. In the third study we exposed participants to either happy or sad faces instead of manipulating mood. The exposure to positive or negative facial expressions is thought to elicit effects similar to positive and negative mood regarding information processing. Consistent with the first two studies, the results showed that when exposed to happy faces the automatic evaluation effect was present. However, when exposed to sad faces the automatic evaluation effect disappeared.

Detailed analyses of the data showed that the differential influence of mood on the automatic evaluation effect was due to slower responding to consistent pairs (positive prime and positive target or negative prime and negative target) when negative mood increased. In the third study a neutral baseline was added to the automatic evaluation paradigm. The results revealed that when exposed to happy faces the automatic evaluation effect was present, with the baseline falling in between responding to consistent word pairs and inconsistent word pairs. However, when primed with sad faces responses to consistent pairs were slower than responses to the neutral baseline.

These studies supported our hypothesis that mood influences the automatic evaluation effect. Furthermore, the results showed that in negative mood quick responding to consistency was suppressed. Presumably, negative mood or exposure to sad faces leads to a cautious processing style, which includes avoiding errors. As fast responding to automatically activated attitudes is error prone, the first spontaneous response is suppressed. We have called this the automatic caution effect.

Attitude-behavior link

The differential reliance on intuitive processing in positive and negative mood should also have consequences for behavior regulation. In Chapter 3 the effect of mood on the attitude-behavior link was studied. In four studies the influence of mood on the relation between implicit attitudes and behavior and belief-based attitudes and behavior was examined. In these studies first the implicit attitude, the belief-based attitude or both were measured. Three days or more after the first session participants returned. Mood was manipulated and behavior observed. The attitude objects of interest differed across studies (i.e., political parties, blood donation and apples and candy bars) as well as behavior observed (i.e., seating distance towards poster of political parties, filling out a form to receive information on blood donation and the choice between an apple or a candy bar). The results of these studies consistently showed that in positive mood the relation between the implicit attitude and behavior was very strong, while the relation between the belief-based attitude and behavior was weak. Conversely, in negative mood belief-based attitudes were predictive of behavior, while implicit attitudes were not. Thus, in positive mood individuals tend to rely on their implicit attitudes in acting towards the object, while individuals in negative mood consider their beliefs when acting towards the object.

Presumably, positive mood informs the individual that the current situation is safe and benign. Adopting an intuitive processing style will suffice. As a result individuals rely on automatically activated attitudes and behavior towards the attitude object is guided by implicit attitudes. Beliefs, however, are not considered in positive mood when acting towards the object. Intuitive processing is not conducive of reflection on knowledge and beliefs. Therefore, the relation between beliefs and behavior is weak in positive mood. Negative diffuse affect is thought to signal that the current situation is problematic. Then it is most adaptive to abandon reliance on intuitive processing and adopt a deliberative processing style. Individuals in negative mood do not rely on their first evaluation that comes to mind when acting towards the object. Instead, pertinent beliefs are scrutinized. Therefore the relation between beliefs and behavior is strong in negative mood.

Conclusions

The present dissertation offers more insight in the effect of mood on automatic processing and behavior regulation. We have shown that diffuse positive affect elicits reliance on automatically activated attitudes and intuitive behavior regulation. Negative diffuse affect, on

the other hand, leads to automatic cautious processing (i.e., to refrain from quick responding to automatically activated attitudes) and deliberative behavior regulation. With the present work we have contributed to the understanding of mood effects on information processing, specifically on automatic processing and behavior regulation in the attitude domain.

Nederlandse samenvatting

Diffuus positief en negatief affect (of stemming) beïnvloedt informatieverwerking. Anders dan specifieke emoties wordt diffuus affect niet toegeschreven aan een specifieke bron. Hierdoor beïnvloedt stemming niet direct gedrag ten opzichte van een bron. Positieve stemming leidt over het algemeen tot intuïtieve informatieverwerking, terwijl negatieve stemming leidt tot deliberatieve informatieverwerking. Vele aspecten in ons dagelijks leven kunnen beïnvloed worden door de stijl van informatieverwerking. Denk bijvoorbeeld eens aan de aankoop van een computerspel. Wanneer je langs het rek met spellen loopt kun je nadenken over kenmerken van de spellen ofwel beslissen op basis van bijvoorbeeld het enthousiasme van een vriend over een bepaald spel. Stemming kan dit proces van kiezen beïnvloeden. Negatieve stemming zal er toe leiden dat je nadenkt over kenmerken van de spellen, terwijl een positieve stemming ervoor zal zorgen dat je afgaat op de voorkeur van je vriend. De keuze op basis van kenmerken is voornamelijk een gecontroleerd proces, met beperkte invloed van automatische processen. De keuze die gebaseerd is op de voorkeur van je vriend is minder gecontroleerd en al meer automatisch. Echter, veel menselijk gedrag is voor een groot gedeelte automatisch en niet zozeer gecontroleerd. Wanneer je een computerspel koopt kan het evengoed zijn dat je langs het rek loopt op weg naar de kassa en impulsief een spel meeneemt. Welke invloed kan stemming op dit gedrag hebben? Het is opvallend dat er weinig aandacht is geschonken aan de invloed van stemming op automatisch processen en daaruit voortkomend gedrag. Daarom is het effect van stemming op deze vorm van informatieverwerking grotendeels onbekend. Het doel van dit proefschrift is dan ook om onze kennis over de invloed van stemming op automatische processen te vergroten. Ten eerste hebben wij de invloed van positieve en negatieve stemming op automatische processen onderzocht. Tevens is het effect van stemming op automatische (versus gecontroleerde) processen in gedragsregulatie bestudeerd.

Diffuus affect

Een positieve stemming leidt tot intuïtieve informatieverwerking. Intuïtieve verwerking houdt ondermeer associatieve verwerking in. Elementen (informatie) zijn verbonden door middel van simpele associaties. De activatie van één element kan zich verspreiden naar andere

elementen. Informatieverwerking is daardoor ook snel en holistisch. Een negatieve stemming leidt juist tot deliberatieve informatieverwerking. Deliberatieve informatieverwerking houdt seriële en analytische verwerking in. Kennis wordt overdacht alvorens beslissingen worden gemaakt en gedrag wordt uitgevoerd. Eén theorie over de reden dat stemming informatieverwerking beïnvloedt gaat ervan uit dat stemming het individu informeert over de staat van de omgeving. Positieve stemming geeft het signaal dat de situatie veilig is. In deze situatie is intuïtieve informatieverwerking voldoende. Negatieve stemming geeft een signaal dat er een probleem is in de omgeving. Om je aan deze situatie aan te passen wordt er niet langer intuïtief verwerkt, maar juist deliberatief.

Onderzoek naar stemmingsinvloeden hebben over het algemeen inderdaad aangetoond dat een positieve stemming intuïtieve informatieverwerking induceert, terwijl negatieve stemming leidt tot deliberatieve informatieverwerking. Dit onderzoek heeft zich echter voornamelijk gericht op de effecten van stemming op expliciete oordelen. Hierdoor is de invloed van stemming op automatische processen en gedragsregulatie voor een groot deel onbekend. Wij hebben ons gericht op deze kwestie en hebben het effect van stemming op automatische processen en gedragsregulatie in het attitude domein onderzocht.

Attitudes

Een attitude is de evaluatie van een bepaalde entiteit (bijv. een object, een persoon, een instelling enz.). Het is inmiddels duidelijk dat attitudes zowel de uitkomst kunnen zijn van automatische als deliberatieve processen. Ten eerste, bij het waarnemen van een object (bijv. een ‘snickers’) wordt de geassocieerde attitude (‘positief’) automatisch geactiveerd. Deze automatische attitude (of impliciete attitude) kan eveneens gedrag ten opzichte van het object beïnvloeden. Attitude processen kunnen ook deliberatief zijn. Attitudes die gevormd zijn door middel van deliberatieve verwerking hebben vaak beliefs (ofwel overtuigingen, bijv. dat je van snickers dik wordt) als basis. Deze attitudes zijn gebaseerd op de waarschijnlijkheid (bijv. hoe waarschijnlijk je het vindt dat je inderdaad dik wordt van snickers) en de evaluatie (bijv. in hoeverre je dik worden van snickers positief dan wel negatief vindt) van kenmerken van het object. Van deze belief-based attitudes wordt eveneens aangenomen dat ze gedrag beïnvloeden, alhoewel onderzoeksresultaten niet eenduidig zijn.

Het huidige proefschrift

Attitude processen kunnen dus zowel automatisch als deliberatief zijn. De vraag die dan opkomt is wanneer mensen afgaan op automatisch geactiveerde attitudes en wanneer op belief-based attitudes. Het huidige proefschrift heeft zich gericht op de invloed van stemming op de automatische activatie van attitudes en op de relatie tussen impliciete attitudes en gedrag en belief-based attitudes en gedrag.

Het automatische evaluatie effect

In hoofdstuk 2 hebben we gekeken naar de invloed van stemming op automatische attitude activatie. De activatie van attitudes wordt in de regel gemeten door middel van een reactietijden paradigma. In één zo'n paradigma worden na elkaar bijvoorbeeld twee woorden gepresenteerd. Het eerste woord is een object (bijv. 'spin'), het tweede woord is een adjectief (bijv. 'slecht'). De proefpersoon wordt gevraagd om zo snel mogelijk aan te geven of dit laatste woord positief of negatief is. De respons is over het algemeen snel wanneer het object (spin) en het adjectief (slecht) overeenkomen in valentie, maar langzaam als het object (spin) en het adjectief (goed) niet overeenkomen. Dus wanneer het object 'spin' wordt waargenomen wordt de negatieve attitude geactiveerd, waardoor het makkelijker wordt om te reageren op woorden die ook negatief zijn en moeilijker om te reageren op woorden die positief zijn. Dit effect zal aangeduid worden met het automatische evaluatie effect. In alle studies in hoofdstuk 2 hebben we gebruik gemaakt van dit paradigma of een gerelateerd paradigma (de EAST). In de eerste twee studies werd stemming gemeten of gemanipuleerd. De resultaten laten zien dat in een positieve stemming of wanneer negatieve stemming laag was het automatische evaluatie effect aanwezig was, ofwel snelle reacties op consistente woordparen en langzame reacties op inconsistente woordparen. In een negatieve stemming of wanneer negatieve stemming hoog was werd dit automatische evaluatie effect niet gevonden. In de derde studie kregen proefpersonen foto's van vrolijke of verdrietige gezichten gepresenteerd in plaats van een stemmingsmanipulatie. De presentatie van gezichtsuitdrukkingen leidt tot vergelijkbare effecten betreffende informatieverwerking als stemming, zonder direct stemming te beïnvloeden. Consistent met de eerste twee studies bleek uit de resultaten dat in de vrolijke gezichten conditie het automatische evaluatie effect aanwezig was, maar niet in de in de verdrietige gezichten conditie.

Dit effect van stemming en gezichtsuitdrukkingen op het automatische evaluatie effect werd veroorzaakt door langzamere reacties op consistente woordparen in een negatieve stemming (of in de verdrietige gezichten conditie) in vergelijking met een positieve stemming (of in de vrolijke gezichten conditie). In de derde studie werd een neutrale baseline gecreëerd in de reactietijden taak. Uit de resultaten bleek dat de snelheid van antwoorden op de baseline in de vrolijke gezichten conditie tussen de snelheid van antwoorden op consistentie en inconsistentie in viel. In de verdrietige gezichten conditie waren antwoorden op consistente paren echter significant langzamer dan antwoorden op de baseline. De reactie op 'spin – slecht' was dus langzamer dan de reactie op een neutrale baseline.

Deze studies ondersteunen onze hypothese dat stemming invloed heeft op het automatische evaluatie effect. Verder laten de resultaten zien dat in een negatieve stemming snel reageren op consistente woordparen onderdrukt wordt. Vermoedelijk leidt negatieve stemming en de presentatie van verdrietige gezichten tot een behoedzame of voorzichtige informatieverwerkingsstijl. Door deze vorm van informatieverwerking worden ondermeer fouten vermeden. Omdat snel reageren op automatisch geactiveerde attitudes makkelijk leidt tot het maken van fouten, wordt de eerste reactie op deze attitude onderdrukt. Wij hebben dit effect het 'automatic caution effect' genoemd.

Attitude-gedrag link

Het verschil in mate van intuïtieve verwerking in positieve en negatieve stemming zal ook consequenties hebben voor de regulatie van gedrag. In hoofdstuk 3 hebben we het effect van stemming op de attitude-gedrag link onderzocht. In vier studies werd gekeken naar de invloed van stemming op de relatie tussen impliciete attitudes en gedrag enerzijds en de relatie tussen belief-based attitudes en gedrag anderzijds. In deze studies werd eerst de impliciete attitude, de belief-based attitude of beide gemeten. Minimaal drie dagen later kwamen de proefpersonen terug. Nu werd stemming gemanipuleerd en gedrag ten opzichte van het attitude object geobserveerd. De attitude objecten varieerden tussen de studies. Zo hebben we gebruik gemaakt van politieke partijen, bloeddonatie en appels en chocolade repen. Ook het gedrag wisselde. We hebben gekeken naar de afstand die proefpersonen namen van posters van de politieke partijen, de hoeveelheid persoonlijke informatie dat proefpersonen wilden verstrekken om informatie te ontvangen om bloeddonor te worden en de keuze tussen een appel en een chocolade reep. De resultaten van deze studies lieten telkens zien dat in een positieve stemming de relatie tussen de impliciete attitude en gedrag sterk was, terwijl de

belief-based attitude gedrag niet voorspelde. In een negatieve stemming voorspelde de belief-based attitude gedrag goed, terwijl de relatie tussen de impliciete attitude en gedrag zwak was. Dus in een positieve stemming gingen mensen af op hun impliciete attitude, terwijl in een negatieve stemming beliefs overwogen werden.

Een positieve stemming geeft het signaal dat de situatie veilig is. Het is dan voldoende om een intuïtieve verwerkingsstijl aan te nemen. Hierdoor gaan mensen af op hun automatisch geactiveerde attitudes en wordt gedrag gestuurd door impliciete attitudes. Beliefs worden echter niet overwogen in een positieve stemming. Intuïtieve informatieverwerking bevordert nadenken over informatie niet, waardoor de relatie tussen beliefs en gedrag zwak is. Negatief diffuus affect geeft het signaal dat er een probleem is in de huidige situatie. In dat geval is het het meest adaptief om niet langer intuïtief te verwerken, maar om een deliberatieve verwerkingsstijl aan te nemen. In een negatieve stemming wordt er dan ook niet meer gehandeld naar de eerste evaluatie die in de persoon opkomt. Juist beliefs worden overwogen. Hierdoor is de relatie tussen beliefs en gedrag sterk in een negatieve stemming.

Conclusies

Het huidige onderzoek geeft meer inzicht in de effecten van stemming op automatische processen en gedragsregulatie. We hebben aangetoond dat diffuus positief affect leidt tot vertrouwen op automatisch geactiveerde attitudes en intuïtieve gedragsregulatie. Negatief diffuus affect leidt juist tot automatische voorzichtigheid (het onderdrukken van snel reageren op automatisch geactiveerde attitudes) en deliberatieve gedragsregulatie. We hopen dat we met dit onderzoek een bijdrage hebben geleverd aan het vergroten van het inzicht in stemmingseffecten op informatieverwerking.

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Berlinda Hermsen
Oktober 2006

Curriculum Vitae

Berlinda Johanna Maria werd op 26 augustus 1980 geboren in Elst (gelderland). Nadat, na een aantal jaar, de basis principes als lopen en kleuren genoeg geoefend waren, ging zij naar de crèche genaamd ‘klein duimpje’ om vervolgens de stap naar de basisschool ‘de sunte werfert’ te maken. Berlinda mocht in 1992 in de ‘grote’ stad naar school om aan het Nederrijn College (nu beter bekend als het Olympus College) haar VWO diploma te behalen. In 1998 was de tijd gekomen om de volgende stap in de toekomst te zetten en na veel wikken en wegen besloot ze toch maar om psychologie te gaan studeren. Al snel bleek dit geen verkeerde keuze te zijn en na haar afstuderen in 2002 begon ze als AIO aan de vakgroep Sociale Psychologie in Nijmegen. Aangezien u dit nu leest, betekend dit dat ze haar AIO periode inmiddels heeft afgesloten.